

Caitlin Gillies

Finalist in the 14 to 18 age category

Are engineering and technology essential for future development?

800 million cars, 1.7 billion computers, 1.3 billion fixed landline phones, 1.5 billion TV sets and 2.7 billion mobile phones are sat on street corners or in our houses worldwide. We love the excitement of something so clever you can find answers to almost everything in just one click. We ponder how our words spoken in rainy England can be heard within a second all the way in sunny Australia. We love it so much we spend 100's of billions on it each year. And engineering has an equally avid following. Nearly everyone who reads this will have been in a car today. Nearly everyone who went in that car was in a building today.

Every second, three more computers are bought. It took 27 years to reach the 1 billion computer mark but it's expected to take only 7 years to get to 2 billion. In answer the original question not only is technology and engineering essential for future development but it has become somewhat of a basic human need.

Mobile Phones. Once they were nearly a foot long, weighed at least 8 pounds and were so expensive only the rich could afford one. Now though most of us are never far from our phones and the comforting sound of a text message. 60% of the world's population has one, including all the third world countries. It's this figure that highlights why technology is absolutely essential for future development. Imagine you're a Kenyan farmer. You work far out in African bush tending cattle. You're on your own. You begin to get a sickening pain in your chest. If you had a mobile phone you could call for help. If you didn't you'd die. Your family loses their income. Your village loses their milk and meat supply. All because you didn't have that piece of metal in your pocket. This is just a small example of the technology the third world requires to develop. Medical apparatus, building supplies, water cleaning equipment, Africa requires them all.

Global warming. If you flick through any magazine or news channel you'll find at least one article on our generation's big obstacle. We need a solution and one that won't mean destroying all our cars and walking 20 miles every day. I believe that one solution could be to turn our attention towards engineering.

Every day 1479 people die from cancer. 2880 children are killed by malaria. 5500 people die from aids. Just those three figures are the equivalent of the 9 11 happening 3 times in one day, or the whole of Aylesbury High School being wiped out every hour. While these numbers might shock, the amount of people dying from the same disease in medieval times could have been double. This proves that technology and engineering has helped to save countless lives but also that it still has no long way to go.

In conclusion, can anybody reading this imagine a world without mobile phones, computers, televisions or cars? Or how about bicycles, houses or medical equipment? I don't believe there is anyone out there who could truly justify how our world could survive without these modern devices which are now so used to.

And in order to develop further we need to develop the things around us. Which is why in answer to the original question, I do believe that technology and engineering essential for future development.

Caitlin Willis

1st Place in the 14 to 18 age category

Are engineering and technology essential for future development?

"The power of population is indefinitely greater than the power in the earth to produce subsistence for man." Malthus 1789, Chapter 1.

The development of technology and engineering and the ways in which they have shaped the way we live means that we have become so dependent on them that the human race is now in a population predicament. They have provided a better standard of living and have helped to create new medicines which mean that the average life expectancy has increased by 22.2 years since 1900.

Without engineering it will become increasingly impossible to feed the growing population. New methods of growing food in smaller spaces with less waste and a higher yield are necessary to cope with this problem. Alternative methods of producing heat and electricity are required. Sustainable methods are required to prevent other world's resources such as consequence of an increasing population and wasteful energy usage and as most energy comes from non renewable sources, a 'Malthusian' catastrophe appears more imminent.

If the population carries on climbing at the alarming rate of 1.10% a year (estimated growth rate 2009) other methods of housing will be needed: inhabiting planets such as Mars by creating biospheres will need to be considered. However, this sort of technology cannot be designed and created without the skill of engineers. Thomas Robert Malthus saw the difference between population growth and resources as being analogous to the difference between exponential and linear growth. Currently most populations are experiencing exponential growth. Some population has inhabited a new country, or when countries are suffering from wars or epidemics, the population will still grow and will eventually reach the limits of the resources provided by the Earth.

As technology and engineering have got us into the problem of the battle between resources and population we are inevitably going to have to rely on them to resolve it. However, it remains to be seen as to whether technology and engineering can solve the problem or just prolong the status quo. Is there something else that will get us out of this predicament or will we reach a point where the human race becomes the architect of its own destruction?

I realise throughout this essay that main points have been about the population and resources but I believe that the future can't be developed and sculpted in the same way as it has been in the past. We have reached a point where technology and engineering are so dominant a part of our lives that without them the human race will suffer; but with them, unless developed in the right way, they will lead the human race into even more of a problematic situation.

Lizzie Worden

Finalist in the 14 to 18 age category

Are engineering and technology essential for future development?

As an aspiring engineer, I am tempted to say without hesitation, "Of course! Just look at how far it's brought us!". Engineering has provided us with ways to control and harness the awesome power of mother Earth; the Thames Barrier, earthquake proof buildings and the solar panel are just a few examples. Technology has given us dialysis machines, pacemakers and MRI scanners which help to sustain us well beyond our 'natural' years. There is no denying that engineering and technology has completely transformed our lives, but is it all for the best?

Some people accuse technology of weakening our moral values. Families now spend more time in front of TVs in silence than outdoors playing. The birth of the laptop and mobile phone mean there is now no such thing as 'clocking off' - we are always in constant contact with the world, from the age of eight.

The human race has brought itself more freedom and comfort, but at a cost. One of the worst consequences of improved factory production is cheap unnecessary products made from finite oil and metal supplies. On a weekly basis we are reprimanded for suffocating the planet in greenhouse gases, endangering yet another wild animal or polluting our oceans. All as a result of our cars, the energy and material needs of factories, businesses and our own homes. Air pollutants are on the increase and the World Health Organization states that 2.4 million people die each year from causes directly attributable to air pollution.

There are more positives than negatives though. There is more than one ray of hope for our struggling planet. Among the most talked about uses for developing technology is renewable energy. There have been some truly fantastic breakthroughs; some may describe them as miraculous. One example is an American project which has successfully managed to produce petrol using carbon dioxide and water from normal atmospheric air and the energy of sunlight, featured on 'James May's Big Ideas'. This will not only save unsustainable resources but also save money as present day vehicles will need no conversion. There are now 700 million hybrid vehicles worldwide which produce up to 25% less greenhouse gas emissions than conventional cars. Chemical engineering has also seen the advent of bio-degradable plastics and textiles.

I recently went around a 'Toys 'R' Us' store with my younger cousins. I was amazed by the huge variety of educational toys available; numerate frogs, literate dogs and talking books. All this would not be possible without the microprocessor and increasing technological advances in decreasing the size of electronics. Over the last twenty years literacy skills have improved with 16% more of eleven year olds achieving the level they are expected to. I believe this is a result of pre-school children learning how to read with educational toys.

Although we may have endangered our planet with our technology and engineering, with it lays our only hope of saving it and for improving the future lives of people around the world.

Matthew Williams

Finalist in the 14 to 18 age category

Are engineering and technology essential for future development?

In a word 'yes'.

Understanding the past to save the future.

Since the dawn of time humans have strived to make this world easier, from harnessing fire to inventing the wheel, from exhuming ores to constructing tools for farming. Technology, and its application in engineering, have pushed civilisation forward. No aspect of society has been left untouched, in this age of performance cars and instant communication, where the modern world can aspire to what it wants, we need technology and engineering more than ever. As Bill Gates said *'We are only at the beginning of what we have to do.'*

From the start of the industrial revolution, the development of the world sped up, until it reached the fever pitch it is today. Even cutting edge technology can become outmoded in a few months; engineers create the next mobile phone and i-pod, whilst not solving the most fundamental problems with our world. There is more money spent on golfing in Florida than on medical care in whole Africa. Applied in the right way technology can be used for the good of mankind however, it is often used to make a quick buck. Bill Gates also said *'Never before history has innovation offered promise of so much to so many in so a short time.'*

A silent threat.

As the earth's resources dwindle, and the climate starts to change the people who live in the harshest environments are worst affected, while we remain obviously to, or ignore, the facts that as we live better lives, those who need the environment preserving most are watching it fall apart. Senator John Kerry said *'Climate change is real. The science is compelling. And the longer we wait, the harder the problem will be to solve.'*

As the crops fail and the water dries up, conflicts in Kenya and other developing nations are starting to flare up. According to UNOCHA declining rainfall in Burkina Faso has led to fights between farmers and animal herders. But engineers are already devising solutions. Rainwaterharvesting.org cites the case of Saurashtra in western India where small check dams are being created to harvest rainwater in dry season. Already an additional 5100 hectares are under irrigation.

Carpe Diem.

We have the power to change our future, to improve it we apply the greatest gift mankind has; the ability to think. We have the technology; however we need more engineers to devise solutions. We must find ways of maximising our water resources. In addition we can use wind, sun and tides to generate energy. We must seize the moment or it will be too late. David Suzuki exclaimed *'We're in a giant car heading towards a brick wall and everyone's arguing over where they're going to sit.'* However as long as 500 years ago Leonardo da Vinci claimed *'I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough; we must do.'*

Technology and engineering are essential for future development because without them there will be no future.

Tanmoy Banerjee

Finalist in the 14 to 18 age category

Are engineering and technology essential for future development?

Every morning my electronic alarm wakes me up. I get out of bed for a hot power shower with clean water. I put on the kettle, and the toaster, have my breakfast and leave to get on the bus. The bus takes me to school, where the whole day lights are on and I am often on computers, not to mention the hot meals. I get out of school and get on the bus, get home and turn on the television and play on my PS3. then I do some work, where the lights are on again, and the radio is too.

By night-time the lights are off, but nonetheless the streetlights outside are on and my alarm is ready to wake me up the next day. That is just me. That is more than 17kWh for me. Yet I am a part of a four person family, or a 1000 person school, or a 62,041,708 person country. If we were to multiply this amount of energy around the world, the total would be staggering. Over the course of years this total increases, but where does the energy come from?

This power comes from fossil fuels, which are extracted and converted using the technology created by engineers in the past, and over time these have become more efficient. But despite being a great resource, fossil fuels are not sustainable. Engineers are creating technology at the moment, which will help feed our need for power after the fossil fuels have run out, but the technology is not yet good enough. As fossil fuels are utilised engineers have developed technologies to extract oil and gas from ever more challenging locations.

The main use of fossil fuels is for transport. The US alone used about 510 billion litres of petrol in 2006, just for their transport. Many different engines have been developed; electric, hybrid, bio-diesel, ethanol, and fuel cell (hydrogen), however the majority, by a huge amount, still rely on petrol and diesel as fuel, both of which are derived from fossil fuels. When the fossil fuels run out very few pieces of transport will be able to survive, and it will be the engineers who have to develop new methods. New, different transport and ways to travelling long distance will require alternate fuels and vehicles. Both of which will require new technology and engineering to keep up with our growing population.

Without electricity the things that we take for granted could not exist: widespread clean water, hot water, travel, light, entertainment, free information and heating to name a few. Not to mention all the industries that would fail without power. Engineers will be tasked with developing ways to generate the electricity needed to power all the technology we have developed. It is clear that to keep up the current lifestyle, and for future development, engineering and technology is essential to 'fuel' our needs.

Thomas Hanson

Finalist in the 14 to 18 age category

Are engineering and technology essential for future development?

In short, definitely.

To elaborate, forgetting future development for a second, the concept of modern human civilisation would collapse if all technology was to cease to exist even for a few hours, and the reintroduction of technology would be the salvation that would bring us back out of this hypothetical rubble. Admittedly it took around 300,000 years for technology to advance from the wheel to computers, but the rate of technological engineering is by no means linear; in 1993 the internet was nothing but a potential for quick information access anywhere deemed important enough to be connected, but the following decade showed it to be one of the most important inventions of the modern age, networking everything from the President of the United States' personal investments to budding relationship between two people separated only by miles thanks to the growth and acceptance of the internet into the public's homes and hearts.

Currently robotics, entertainment, augmented reality and Virtual and Artificial Intelligence are the 'hot buttons' of research, all tailored to comfortably fit into, and improve, the life of the general public. While cathode ray tube televisions are seen as a thing of the past and the world is getting ready for the onset of OLED, HD and Blu-Ray, soon the future will be crowded by technological advances on technological advances made redundant by the next innovator's bright idea. For example, a young woman may go out to purchase a brand new OLED television to watch her favourite shows and a microwave to quickly heat up a delicious, but not necessarily healthy, treat for a hard day's work, after which even the thought of a massage sends shivers down her spine. Ten years later, she gets home to a VI controlled robot which turns on the three-dimensional hologram in the front room and prepares her tea for her, ending the evening with an indulgence into the robot's vibration function. Not necessarily accurate, but I believe a decent approximation of the advances made and to be made in our society.

However, the advancement of technology must coincide with advance in human understanding and acceptance; if army technology was somehow made available to early man, the motivation to use it correctly and responsibly would simply not exist and destruction and confusion would ensue. Though this is an extreme example, it demonstrates how we must evolve as people before we are capable of morally utilising whatever engineers produce.

Technological progress is not just civilian; things like MRI machines in hospitals are all there because of an idea that was allowed to expand and take from thanks to the resources available to the research and engineers behind things like that. Industrially, hydraulic human 'exoskeletons' are in development to help with heavy lifting and robotics are being seen more and more frequently on production lines, but the right mind can tweak an object to change its function completely; what in an industrial setting simply helps a worker move heavy objects could be the key to getting a paraplegic to walk again. The numerous applications of modern technology are far too vast to ignore.

In conclusion, advancements in technology and engineering are inevitable, undeniably making them essential to the advancement of humanity and, if the past 100 years show anything, in 100 years time, the world will be unrecognisable.

So, in shorter, yes.

Yuchen Wang

Finalist in the 14 to 18 age category

Are engineering and technology essential for future development?

What does the future hold? It's a question that everyone asks. In an effort to look into the future, we often look for clues from the past. From the wheel of 5000BCE to the Watt engine of the Industrial Revolution, the use of technology has long been a part of human development.

When we talk about technology today, we automatically think of computers, iPods, and the internet. However, technology has not always been in this form. Take one of the key periods in human development – the Stone Age. It was characterised by the use of stone tools such as the flint. Moving on 2.5million years or so, man entered the Industrial Revolution fuelled by the Watt Steam Engine. Ask anybody in the 1800s what technology was, and they'd almost definitely have answered with the Watt Steam Engine, or the Newcomen Engine that came before it, but almost certainly not the flint.

Fast forward another 200 years, to an era where 1.7 billion people are connected to the internet. Ask any person on the street that very same question, they'd almost definitely come up with the PS3 or another electronic product as their answer. The last thing on their mind would be the Watt Steam Engine that fuelled the Industrial Revolution.

Ask any teenager today to tell you of a key development in human history from the 1960s and 1970s, and they'd no doubt answer with the moon landings of the Apollo missions. Yet ironically, not many of them would answer with the ARPA or the ARPANET; the predecessors of the modern World Wide Web, Facebook and MSN that many of them desperately can't live without.

In 2008, according to the Office for National Statistics, 72% of UK households have a PC, a far cry from 1943, when Thomas Watson; Chairman of IBM had famously said "I think there is a world market for maybe five computers." Little did he know also, that the size of modern computers would shrink to a tiny fraction of what it was, yet capable of thousands of times more calculations per second, and can offer billions of times more in terms of data storage.

Just as the flint proved to be a key tool in the development of mankind, the Watt Steam Engine has played just as big a part in the Industrial Revolution. Technology has constantly changed and has always been part of our development. Yet, it is also very unpredictable. Just as an example, a caveman from the Stone Age wouldn't have even thought of the wheel, let alone cars. Engineering and technology have been with us throughout history, and are therefore likely to stay with us and help us develop the future. Just as the cavemen couldn't have predicted the arrival of social networking in the 21st century, technology of the future just might not be in the form that we know today.