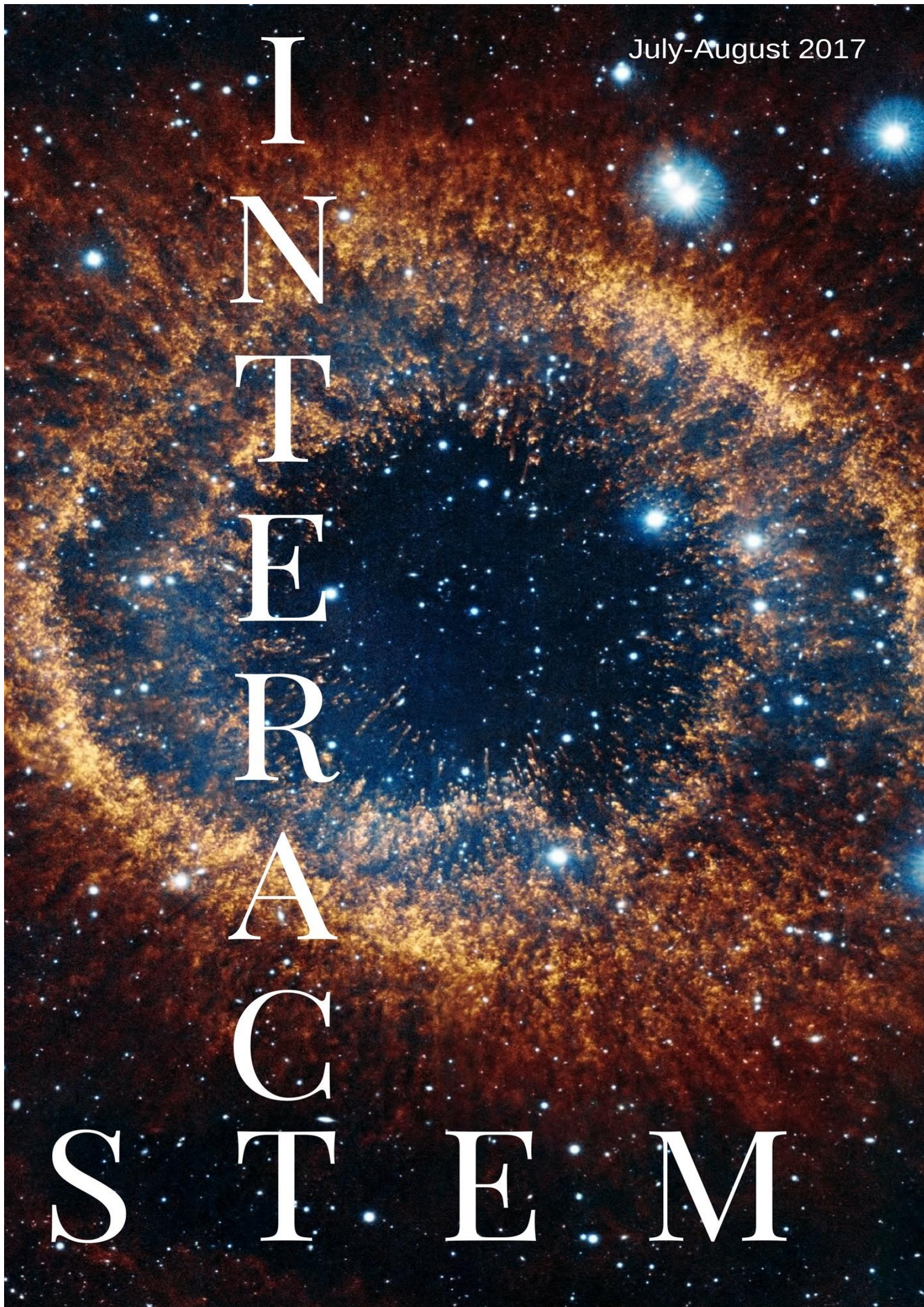
July-August 2017
INTERACT
STEM

July-August 2017

Hello Readers,

Welcome to the July-August edition of the INTERACT+STEM magazine.
The STEM section of the magazine serves the purpose of promoting the STEM fields. It is not to pronounce student verdict on scientific dilemmas, but to raise curiosity in the reader, to urge them to search for information and formulate their own theories.
The whole purpose of adding a comprehensive section like INTERACT is an attempt to offer a more wholesome approach towards solving global problems and intellectual dilemmas. A perspective formed by the knowledge of the workings of the social and emotional orders in amalgamation with the established scientific and natural orders would be a more informed and nuanced opinion.
The sections have varied objectives: INTERdisciplinary ACTivities focuses on the mixture of two subjects, or rather approaches, to take on challenging problems; INTERviews and interACTions introduces us to the words of wisdom of interdisciplinary pioneers of their field; world INTERACTions brings to us stories on the monthly headlines; and INTERACTive games get those neurons firing. The whole section is based on the holistic approach of 'the whole is greater than the sums of its parts.' Interdisciplinary studies give our brain that wholesome knowledge base it needs.
In this issue, we take you on a journey through the Dark Web, Computational Fluid Dynamics, Music and Medicine, and much more.
At last, all I can say is I hope you enjoy reading the magazine as much as we enjoyed putting it together.

Anushree Gupta

STEM

Is Climate Change Real?

The debate on climate change has been raging for a very long time now. With the recent elections in major western nations, there has been a policy shift on issues relating to carbon emissions. The row behind the debatably human-caused natural phenomena is in that of the conjecture of the truth- rather the conjecture of truth(s)- behind it.

So is climate change real? Where does the truth lie? It perhaps lies in neither of the two extremes. Perhaps it lies somewhere in the middle.

First things first, temperature rise has happened. Land and ocean temperatures have risen nearly 0.74°C over the last hundred years which is definitely because of rise in carbon dioxide levels. But what is debatable is the implications of such a temperature rise.

As for the scientist models predicting wide-scale natural disasters, there is too less of an evidence to be able to concretely predict such calamities.

A survey conducted by John Cook in 2013[1], however, might explain the general consensus on climate change. According to it, 97% of all climate scientists accept that climate change is real, large and a threat to the future of humanity. Now, what flaw could there be in a theory so many scientists claim to be true? Prof. Muller at UC Berkeley thinks otherwise.

In this article, he claims, "The problem is not with the survey, which asked a very general question. The problem is that many writers (and scientists!) look at that number and mischaracterize it. The 97% number is typically interpreted to mean that 97% accept the conclusions presented in An Inconvenient Truth by former Vice President Al Gore." He also criticizes the survey by asking the following. "There is another way to misrepresent the results of the polls. Yes, 97% of those polled believe that there is human caused climate change.

How did they reach that decision? Was it based on a careful reading of the IPCC report? Or was it based on their fear that opponents to action are anti-science? The debate on climate change stems from the claims made by US Vice President Al Gore in his Nobel Peace prize-winning film, An Inconvenient Truth. He also proposed some very controversial solutions to the problems of human-initiated climate change, many of which have been included in major governmental programs across the world. Some of these suggestions include irrelevant things like the 'Carbon Tax' proposed in the US Congress. Why is it irrelevant, you may ask? One of the biggest reasons is the inability of such laws to transgress international borders. According to carbon emission reports, a majority of the European and American carbon emissions (having the highest emissions per capita) are on a steady decline. So, what should be the solution?

The solution is to act. Instead of politicizing such an issue of worldwide concern, collective action should be taken. Energy conservation should be adopted. Large-scale replacement of natural gas and other fossil fuels should be implemented. While more avant-garde forms like solar energy become mainstream, focus on nuclear energies. An earth-wide implementation of such policies could do great service to all of us.

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[1] Cook, John (May 2013). "Quantifying the consensus on anthropogenic global warming in the scientific literature" (PDF). *Environmental Research Letters*. IOP Publishing.

Hurdles in the Human Colonization of Outer Space

Ever since humans have walked on the surface of Earth, they have always tended to travel the lands and voyage the seas. It thus becomes all the more important to trigger the exploration beyond Earth. Space travel, however, is a dangerous, and maybe impossible project. I have listed out, what I believe, are the 6 greatest challenges in space travel.[2][3]

Challenge 1: Gravity and Fuel Costs
Just to launch the Mars Curiosity Rover, it cost NASA $200 million. This was nearly a tenth of the mission's cost. When a spacecraft blasts off, the gravity of Earth works against its flight. In fact, Earth's escape velocity is roughly 11.2 km/s. To obtain such a velocity, a tremendous amount of the expensive rocket fuel is needed.

Challenge 2: Enormous Distances
India's Mars Orbiter Mission took approximately 11 months to reach Mars. The challenge is that with present-day technologies, space travel takes immense amounts of time. Just to give you an idea of the size of our cosmic neighborhood, the distance between Jupiter and the Sun is roughly the same as between Jupiter and Saturn; and we aren't over with the solar system yet. And with humans onboard, a space voyage beyond, something like Pluto could potentially be multi-generational.

Challenge 3: Space Debris
The problem of space debris can't be neglected. The US Space Surveillance Network identifies roughly 500,000 objects enough to inflict note-worthy damages—hurtling around Earth at speeds of more than 28,000 kmph. Spacecraft systems are so delicate that even a small piece of paper can cause major systems to go down.

Challenge 4: Food and Water
It is extremely expensive to stock up space-food in rockets for the astronauts. Not that food is costly but because it can take up a lot of the valuable space in a space-craft. More importantly, the increased weight of craft because of the supplies can greatly increase the amount of fuel needed, especially for long distance journeys

Challenge 5: Harmful Radiation
Earth is safe; credits to the atmosphere and the magnetosphere. But outer space lacks both of them. The Sun (like all stars) emits ionizing, sub-atomic particles moving close to the speed of light; this is what we call the cosmic radiation. Such radiations are directly linked to cataracts, cancer and Alzheimer's.

Challenge 6: Micro-Gravity and Weakness
Space is a harsh environment that affects the body in many ways. Prolonged exposure to weightlessness increases the risks of kidney stones and bone fractures, and both are associated with bone demineralization. Changes in muscle performance, coupled with the effects of microgravity on connective tissues and the demands of activities of varying intensities, place astronauts at risk of fatigue and injury.
Thus, it is true that one day, due to uncontrolled exploitation of resources, human will have to leave Earth as a whole, in search of life elsewhere. And if that day has to come, we must brace ourselves.

[2] https://www.wired.com/2016/02/space-is-cold-vast-and-deadly-humans-will-explore-it-anyway/
[3] https://www.nasa.gov/

The Case for Renewable Energy

With the overuse and exploitation of fossil fuels picking up rather than diminishing in usage, the world lays its hopes on cleaner, more renewable sources of energy, but their implementation on the ground level is constrained.

The problem is not the will but the means to do it. Solar energy is important, renewable and abundant. One important cost-effective feature is that the excess energy received by individual units can be sent back to the grid for further use. Maintenance can be considered monetarily negligible. And electricity need not be produced every time. The heat from the sun can be directly channeled into appliances like water heaters and solar cookers.

The setup costs are however high. Even in developed nations, with heavy subsidies, solar energy is largely unaffordable to the common citizen. Another major drawback is that the sun doesn't show up in countries where cloudy weather or long nights is a problem. The production processes also involve some toxic materials and hazardous products, which can indirectly affect the environment.

Another clean and green renewable energy resource is hydroelectricity. Unlike solar, hydroelectricity is available all day long, and since engineers can control the movement of turbines, electricity production is as per when is required. Otherwise, the dam stores water and can be used in flood control.

Hydropower, however, causes stagnancy in the water, which depletes oxygen levels in the water. Apart from this, fishing can also severely dwindle the marine populations. The higher volume, high-velocity water inflow can cause the erosion of river banks. It is hard to find a place where hydroelectricity can be produced safely, away from civilization.

Wind energy is also greatly beneficial. It takes up less surface area, which means that this leaves space for alternative land uses, like agriculture, to coexist. The low cost of maintenance and the variable size are also great additions. Villages can use smaller sized windmills to produce electricity with the same efficiency.

There are however, many issues that need to be addressed and solved before generating power from wind energy. The most important problem is to find a place where there is enough wind to cater to the needs of the local population. Winds aren't constant phenomena, not everywhere. The noise produced is unbearable. From the experiences of the current implementation of wind energy, the noise produced by wind turbines is high, thus not allowing homes to be built near to them.

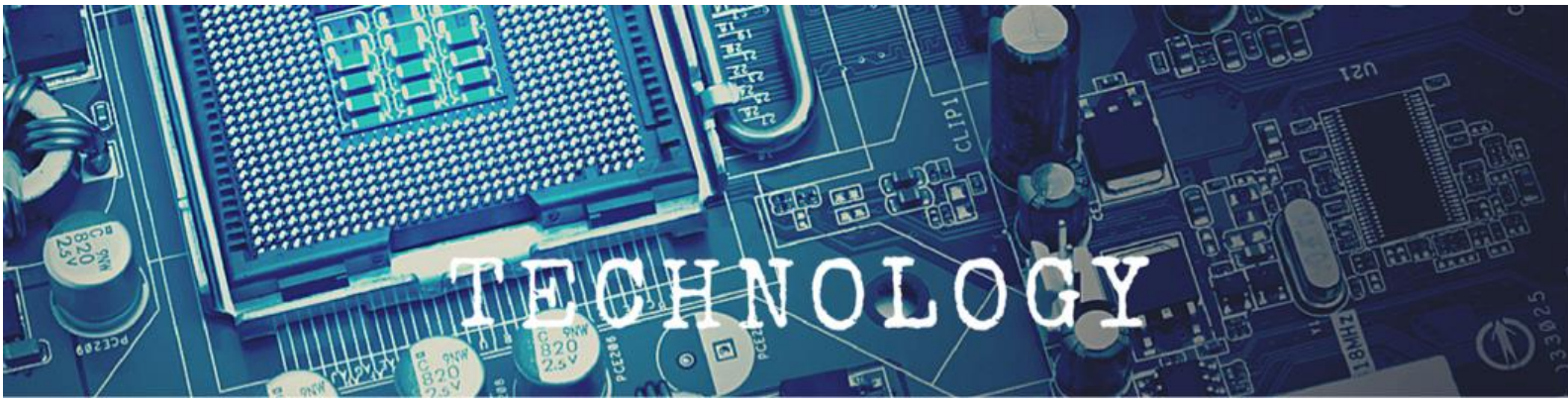
There is another energy source, often more overlooked than its better known counterparts. Geothermal energy. It is renewable too, and its power output can be accurately predicted. It has the one with the smallest occupational use of land. The rising popularity of geothermal energy can be explained by its cost-effectiveness. After the initial expense, a 30-60% savings on heating and 25-50% savings on cooling can cover that cost within few years[4].

But geothermal energy has its own fair share of disadvantages. Greenhouse gas emissions tend to be higher near geothermal power plants, which are associated with sulphur dioxide and silica being released. Just like others, it is hard to find a place suitable for electricity production. And when a site is found, it is far from populated regions, thus making it hard and expensive to transport this energy for consumer or industrial use.

However, with the increasing levels of technological prowess we have started to achieve, all of these faults in energy sources could be overcome. Even without any other developments in the capital, all of these energy sources are better alternatives to non-renewable energy conventionally used. More developed nations like Germany already produce most of their energy from renewable sources, which is great for a start. The challenge is to help newer and currently developing nations adopt this path so that the current rate of resource exploitation could be stopped as soon as possible.

-Aishwarya Joshi

[4] https://www.energysage.com/solar/calculator/



Dark Web

Dark Web, a name which brings the picture of a hacker sitting in front of a screen while writing green lines of codes. It's a name that is often related to illegal activities on the web and it's thought of as malicious side of the Internet. We must analyze the truth within these views and think about, if any, possible uses of the dark web before forming a judgment in our minds.

Before beginning to analyze how dangerous the dark web truly is, we must first understand what it actually is and more importantly how to access it. We must first clear the difference between the deep and dark web. The deep web is a part of the Internet, a part not indexed by Google. This means that it's a part whose webpages aren't added to Google web search (although it sounds scary, you may find relief in the fact that when you open Facebook, there's a highly likely chance that your account is not indexed by Google).

On the contrary dark web is any web like structure, which requires special software to access, an example being the TOR network. It's also important to note that despite their differences the dark web is STILL a part of the deep web. Now that the air is clear on what the difference between deep and dark web is, we may proceed with our enquiry about the dark web. As was mentioned the dark web is a subset of the deep web, existing on top of sub networks such as TOR. This makes it mandatory for the person trying to access the dark web to use special software to access it. Dark web sites are notoriously known for being extremely hard to track down and so are the breeding place for many illegal activities that take place on the internet.

Now that we know what the dark web actually is we may proceed to know how dangerous it can possibly be. As was mentioned earlier, the dark web sites (also known as the dark net sites) are very hard to track down which makes them the home for most of the illegal activities that occur on the internet. Examples of these include illegal pornography being sold and displayed on the dark net sites, drug and human trafficking, arms trafficking and a place to hire assassins.

One of the most famous examples of the illegal sites found on the dark web is the Silk Road. The Silk Road is a front for the sale of drugs and is a highly popular among dealers as all the transactions are made in Bit coins, which make them almost impossible to trace. As a matter of fact most of the transactions made on the dark web are made in Bit coins, contributing to the anonymity of the dark web. In addition to this another popular use of dark web is for child pornography. The biggest online markets for child pornography exist on the dark web, and this happens to be one of the most nefarious problems existing on the dark web. Despite all of these problems, one of the most constructive purposes of the dark web is to report crimes such as domestic abuse without being tracked.

A famous example of this is the whistle blower Edward Snowden. He used the dark web as a tool to contact journalists and reveal classified information about the NSA and their surveillance programs. This also happens to be a core argument for web activists who argue in favor of the dark web, stating that the use of the dark web promotes digital privacy and prevents the government from accessing your personal information by the use of the Internet.

Source: https://www.cio.co.ke/analysis/what-is-the-dark-web-and-deep-web/

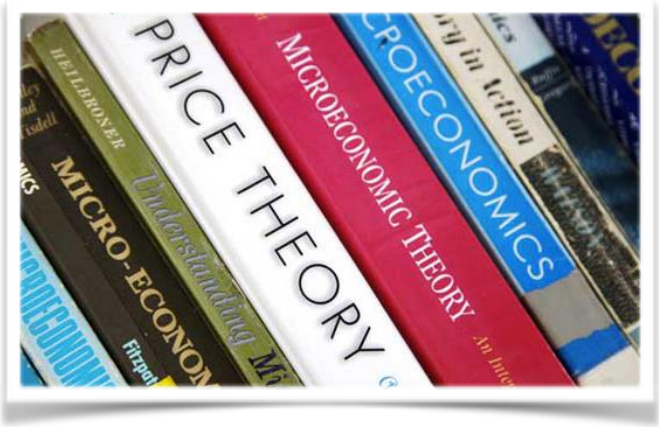
In conclusion, I think that the use of dark web falls in a morally grey area while leaning towards black. What I mean by this is that although the dark web promotes digital privacy and can certainly be used as tool for good, its anonymity is a big factor, which attracts people with nefarious purposes to use it as a front of illegal and depraving activities. Due to this it's advisable not to dabble with dark web unless you're experienced enough to surf it because you never know what dark the next click of a webpage might bring.
-Shubh Lilani

Should Studying Economics Come with a Warning?

Can studying economics change the way you think and behave? The economic way of thinking can help us make better choices. However, is it possible that studying economics could change people's behavior in a way that would be to the detriment of society? Some would argue that it could.

It can be argued that students might be influenced by some of the assumptions that are made in traditional economic theory. As social scientists, economists are always trying to analyze human behavior.

However, people vary in many different ways and have very diverse preferences. If we want to build a theory that predicts how people will behave and respond in different situations, then some type of simplifying assumptions are inevitable.



Traditionally one of the key simplifying assumptions that economists have used in their theories of human behavior is that people make decisions in their own self-interest. There is some debate about exactly what self-interest means. For example it could be argued that giving £10 to charity is acting in your own self-interest if it gives you more pleasure than spending that £10 on yourself.

However, in many of the economic theories that you first study in economics a narrow meaning of self-interest tends to be used. This is clearly illustrated by the following quote from Milgram and Roberts. Referring to economic theory they state that: It is often assumed that people behave as if they were entirely motivated by narrow, selfish concerns. It is important to make it clear that economists are not assuming that people behave in a selfish manner all of the time. Instead, they are assuming that the people in their theories are acting in a selfish manner. The value of making this assumption is whether the predictions about human behavior that follow from using it are supported by evidence from the real world.

Some researchers have argued that when people study economic theory built on this assumption it makes them more likely to behave in a selfish way. The evidence for this comes from a range of research papers. **Here are some findings:**

- Economics students were more likely than those studying other subjects to recommend the most expensive plumber to a student society if that plumber offered the student a side payment.[5]

- Students took part in an experiment in a computer room where they could either keep the money they had been given or donate it to a public good. On average the economics students kept more of the money.[6]

- Economics professors gave less money to charity than professors of other subjects such as psychology and sociology.[7]

- Some studies also found that selfish people were more likely to choose economics as a subject to study and became more selfish after they had studied it for some time.[8]

If you are about to begin your study of economics then perhaps you should take care that your behavior outside the classroom is not being unduly influenced by some of the assumptions you are learning about inside the classroom. On a more practical note perhaps you should avoid sharing a restaurant bill or buying rounds of drinks when in the company of other economists!
However on a brighter note, the evidence in these papers can be interpreted in a number of different ways. There are even some studies that found economics students were less selfish than those on other courses.

REASONS TO STUDY ECONOMICS

- You can talk about money without ever having to make any.
- You can't be wrong; only subject to an unexpected asymmetric shock.
- An economist is an expert who will know tomorrow why the things he predicted yesterday didn't happen today.
- When you are in the unemployment line, at least you will know why you are there.
- Although ethics teaches that virtue is its own reward, in economics we get taught that reward is its own virtue.

[5] http://www.sciencedirect.com/science/article/pii/S0167268100001116
[6] http://onlinelibrary.wiley.com/doi/10.1093/ei/cbg020/abstract
[7] http://www.jstor.org/discover/10.2307/2138205?uid=3739864&uid=2&uid=4&uid=3739256&sid=21102789006803
[8] http://amle.aom.org/content/10/4/643.short

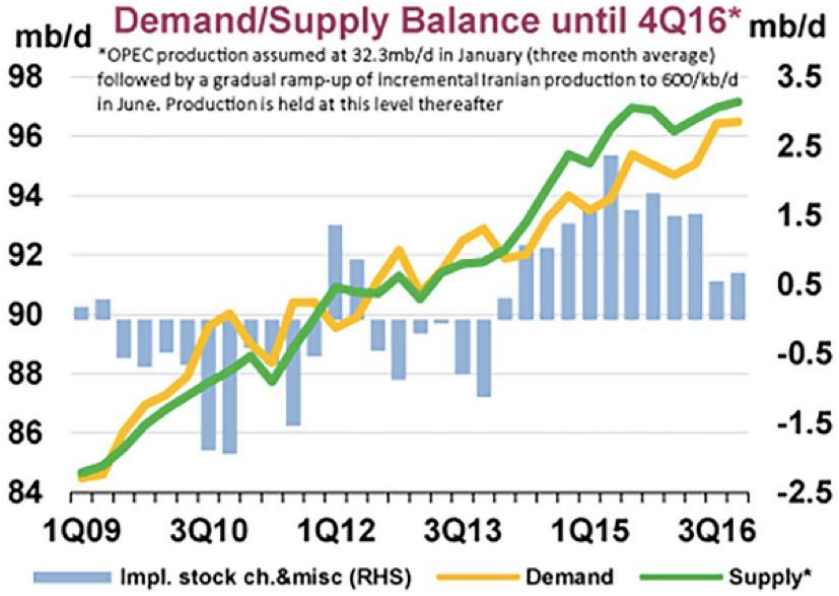
The Trend in Oil Prices

The oil industry has had its booms and busts over the years. But it is clear that over the past 40 years the price of oil has gone from strength to strength. However, over the past 2 Years from July 2014 to present, the oil price has fallen from over $110 a barrel to under $40 a barrel, a breathtaking decline.

Why is Oil so Important?

Oil is a chemical that is composed of many different fractions, which serve many different uses. We can't drive our car without gasoline and the bus can't make it to school without gasoline. Our machines would get too hot or stop moving without lubricating oil. Factories would stop, so would airplanes, people centrally heated buildings would freeze to death and farm machines would come to sputtering standstill and rust. Oil is also used in plastics, fertilizers, nylon clothing, plastics, and detergents among other things.

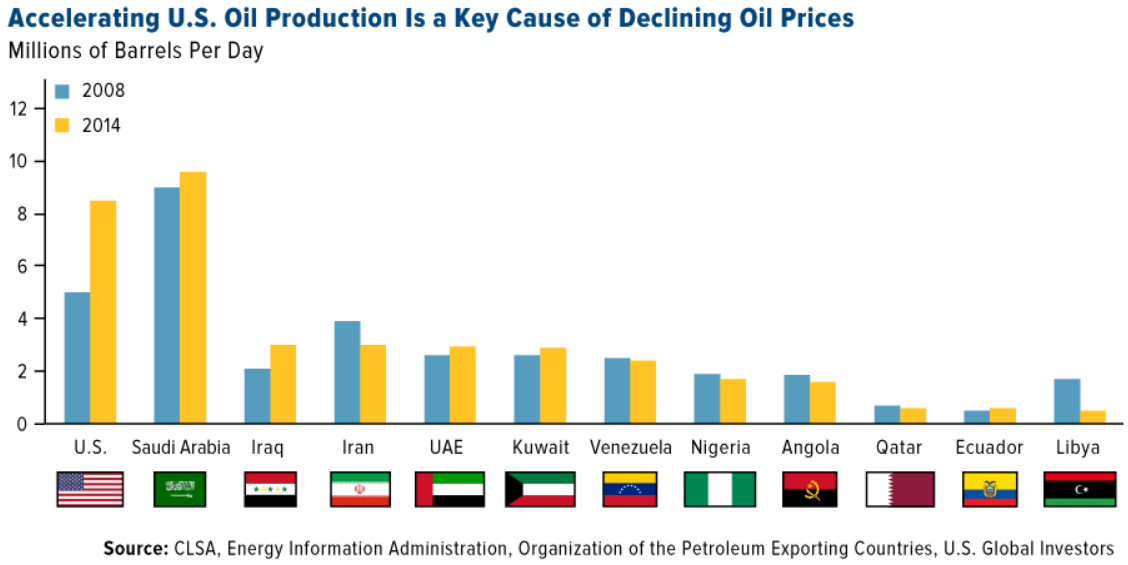
Oil Prices, A History



Source: https://www.iea.org/oilmarketreport/reports/2015/1015/

As you can see, oil prices did not always fall, as the diagram shows, over the 5 Years before mid-2014 and indeed over the past 30 years, oil prices were on an increasing path, going from strength to strength. The simple reason is that during this time demand outstripped supply and thus the price of oil was decreasing. The demand was high as countries recovered from the economic crises and oilfields in Syria and Iraq were stagnated due to civil war in these countries.
But since mid-2014, supply has outstripped demand and thus the price of oil has decreased. The oil supply has increased and demand has decreased due to numerous reasons:
•Higher prices in 2010 in USA caused the drillers there to use innovate production techniques like hydraulic fracking and horizontal drilling to exploit oil formations in areas like North Dakota and Texas, US oil production was double in 2015 of 2010 levels. This increased supply substantially.

•In the Mid-2014, the world economy had started to slow down. Europe was reeling from under the pressure of countries in the Euro Zone going bankrupt. And the Chinese economic growth rate had started to stumble down to 7% down from the average of 10% over the past 2 decades. Yet the United States continued to produce.
•The Dollar has become stronger, causing countries to cut back and limit their imports of oil as it is now much more expensive.
•Iran, due to the lifting of sanctions from United States and European Countries is able to produce and sell much more oil on the international market.
•General Gaddafi had been defeated in Libya and the oil fields in Libya were back online, producing oil. Similarly in Iraq, the government forces had occupied the bulk of oil rich western areas and were now supplying vigorously to cover up for the past losses of oil production, supplying 4 million barrels a day.
•Suppliers of the OPEC, an oil consortium of Middle Eastern, African and South American countries, which supply 40% of the world's oil, refused to hold back. The countries in it continued to produce, hoping to protect their market share.

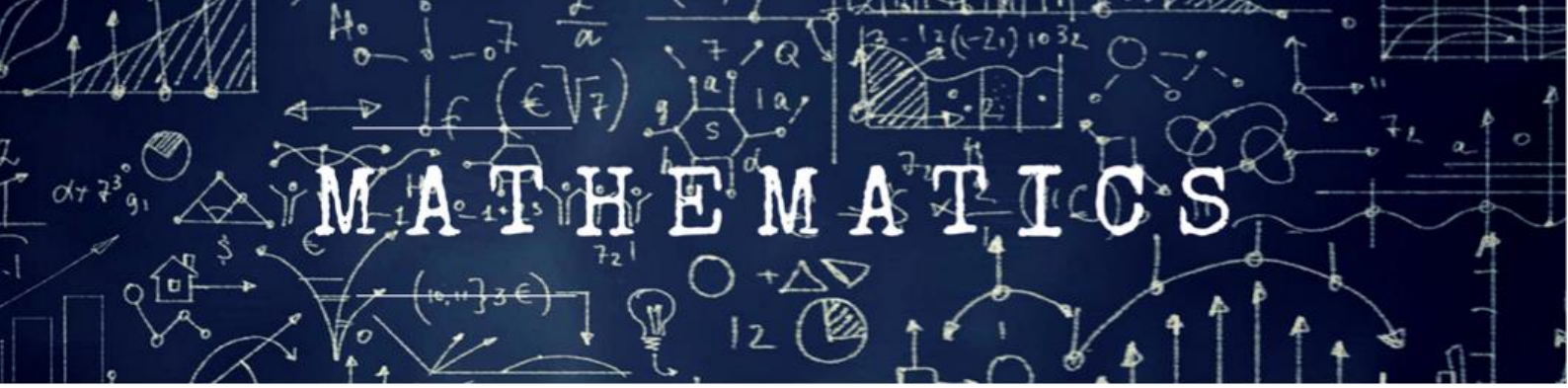


That's the basic story. As long as supply far outstrips demand, oil prices will stay relatively low.

The Winners and Losers

Cratering prices have created all sorts of ripples around the world. Oil is cheaper for people around the globe in all countries. Suddenly, the money spent on gasoline is now spent on other goods and service increasing aggregate demand. Reduced prices have helped reduce the inflation rate of many countries and also substantially reduced production costs reducing cost of goods and services and thus in turn increasing aggregate demand.

On the flip side, producing governments like Russia, Venezuela and Saudi Arabia for whom oil forms the bulk of exports are suffering from a major revenue crunch and are unable to balance their budgets. Smaller oil companies everywhere are seeing profits evaporate and many are having to decrease production, lay off workers or worse, stop production, default and file for bankruptcy.
-Aryan Khandelwal



THE MONTY HALL PROBLEM

The Monty Hall problem is one of the simplest and yet most baffling mathematics puzzles of all, it'll make you scratch your head, your elbows, your knees and what not: All you have to do is choose between two doors, only one of which has a prize awaiting you.

This problem may sound simple, yet everyone gets the answer wrong. Who would want to choose a Goat over a car?

Loosely based on the American television game show *Let's Make a Deal* and named after its original host, Monty Hall, contestants are shown three doors and are told that behind one of them is a Cadillac, and behind the other two are goats. All they have to do is pick one door. After they make their choice, Hall then opens one door, always revealing that the newly opened door has a goat behind it and this always be the case. He then offers the contestant a choice: stay or switch.

How do you choose in order to maximise your chances of winning?

You probably don't need any Einsteinium math skills to solve it, it's just a general knowledge of the laws of probability. And yet most people get it wrong. Surely, there are two doors left and one is a car and the other a goat. Just a 50-50 chance, no matter which ever door you pick.

Wrong[9]. It is not a 50-50 choice, the Monty Hall setup biases you to think that it is. It plays games with your mind.

You should always switch doors to give yourself a 2 out of 3 chance of winning rather than sticking to same one which gives you a 1 out of 3 chance.

The chance of the car being behind door number 1 is 1/3 and that of not being behind door no 1 is 2/3. It's not that complicated as it sounds. After Monty Hall opens door number 2 to reveal a goat, there's still a 1/3 chance that the car is behind door number 1 and a 2/3 chance that the car isn't behind door number 1. A 2/3 chance that the car isn't behind door number 1 is a 2/3 chance that the car is behind door number 3.

[9] http://www.stayorswitch.com/explanation.php

What is it that gives switching doors a higher rate of winning than staying with the same one? Trying out a few scenarios will ease it all. Let's see what will happen if you were to always stay with your original choice. We'll play out three scenarios, one for each door that the car could be behind (door number 1, door number 2, or door number 3).

STAY STRATEGY

Scenario 1: The car is behind door number 1.
Door number 1 is chosen, then the host reveals a goat behind door number 2 and because you always stay with the same door in this scenario, **you win the car**!
Scenario 2: The car is behind door number 2.
You start by picking door number 1, the host reveals a goat behind door number 3, and you're using the stay strategy so you stay with door number 1. **You get a goat** and don't win the car.
Scenario 3: The car is behind door number 3.
Again you choose door number 1, the host opens door number 2 to reveal a goat, you stay with door number 1, and unfortunately **you get a goat**.

Thus, the stay strategy gave us the probability of winning the car once out of the three times we tried. That means that in any one instance of playing the game, your chance of winning the car if you choose to stay is 1/3 or about 33%.

SWITCH STRATEGY

Now, we will create scenarios and switch the doors. Again, we'll always start by picking door number 1.

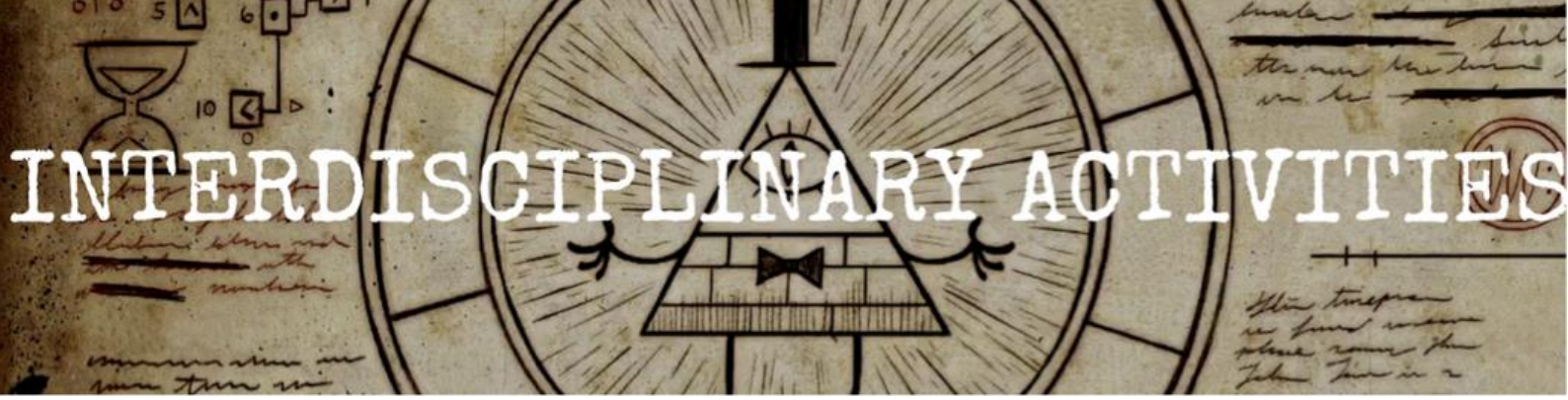
Scenario 1: The car is behind door number 1.
Door number 1 is chosen, and the host opens door number 2 to reveal a goat, you are using the switch strategy so you switch to door number 3. **You get a goat.**

Scenario 2: The car is behind door number 2.
You start by picking door number 1, the host opens door number 3 to reveal a goat, you switch to door number 2 and **win the car!**

Scenario 3: The car is behind door number 3.
You pick door number 1, and the host opens the door number 2 to reveal a goat, you switch to door number 3 and **win the car again!**
So, with the switch strategy you won the car 2 out of 3 times. That means, that in any one instance of the game, your chance of winning the car if you choose to switch doors is 2/3 or about 67%.

Therefore, if you play the game three times and stay, on average you'll win the car once. But if you play the game three times and switch each time, on average you'll win the car twice. That is twice as many cars!
-Naquiya Barwaniwala

INTERACT



Music to my Distressed Nerves

Alzheimer's thrust him into a dark void like none other. It was like having a nightmare he simply couldn't wake up from. His mind began to shut down slowly and gradually. It was both mentally and emotionally exhausting for the dear old man.

It started with something as unnoticeable as losing his car keys and eventually lead to forgetting himself completely. He lost a major chunk of who he was. He lost a part of his soul. He lost himself. Yes, it is devastating to go through it but it is equally emotionally wrecking to watch. You become the witness of a homicide with the murderer being the victim's very own brain.

Now, clear your mind of all thoughts.

Done? Good.

Imagine waking up in the morning and being unable to recall your name or worse, not being able to recognize someone as close to your heart as your 'mum'. This puts you in a major state of sheer panic. The one living being you always relied on- your brain, betrays you. Shatters your self-confidence.

You start doubting every move of yours. You feel lost. You feel lonely.

Eventually, a time comes when you feel nothing.

Nothing at all.

The roadmap to this ginormous disaster is inevitable but the path can be altered. If you think about it scientifically Alzheimer's is a progressive disease that destroys memory and other important mental functions. It is a general term for memory loss and other cognitive abilities serious enough to interfere with daily life. Think about it this way; your brain is a machine and Alzheimer's is rust. At first it won't cause enough problems for you to notice that something's wrong. But somewhere the machine is getting damaged little by little. When you finally realize it, the machine is quite damaged. You can always try to repair it but it will never make a full recovery.

Now, we listen to music every day. Be it songs on YouTube or if you prefer something more authentic then there are musicals at the Opera House. The bottom line is that music is a part of our lives. Music is like a color palette. It adds different shades to our lives. It empathizes with us when we're at our worst. It intensifies the thrill we feel when we're celebrating a victory.

However, did it occur to you that it could help us when we're sick? Yes, music is used as a form of therapy. Well, psychologically. What is music therapy? It isn't something created especially for Alzheimer's disease

Rather, unknowingly we connect to music on an emotional level every day. It not only helps us connect to our deepest emotions but also helps us think straight. Basically, it conditions are minds to function properly. It sooths our nerves and being calm is the pathway to a positive recovery. Dealing with Alzheimer's is like waking up to a dream you can't remember no matter how much you stress on it. Imagine being unable to remember the most beautiful dream you've ever had. It gets on your nerve, doesn't it? Psychologically speaking Music Therapy requires a music therapist to use music and all of its facets—physical, emotional, mental, social, aesthetic, and spiritual—to help clients improve their physical and mental condition.

In relation to Alzheimer's disease doctors choose songs that hold some meaning in the patients' lives. This is done to hit an emotional nerve, which leads to regaining some memories. These memories are a part of who these patients are. Something Alzheimer's takes way from them. The goal of this therapy is giving the tiniest bit of shard that has been taken away from these victims. The aim is to help them stay who they are and not hollow shells of men and women. This magical therapy has been practiced for years by doctors and healers[10]. Moreover, some organizations[11] encourage people to donate iPod drives which are to be used in the treatment of Alzheimer's patients. It doesn't provide complete recovery but it helps the patients stay calm, have some idea about them and help the brain function properly. This therapy believes in returning something you're entitled to. Yourself. Music therapy doesn't only cure your brain but it gives you a chance at a better life. Alzheimer's can shut you off from the entire world; turn your life into a tragic black and white movie. It is Music Therapy that helps you bring back some colors in your life. You're not just alive, you feel alive.
- Diaa Kapadia

[10] https://www.youtube.com/watch?v=4Zo_JQZo3Y0
[11] http://www.musicandmemory.org/

Computational Fluid Dynamics

Computational Fluid Dynamics or CFD uses mathematics, physics and computational software to visualize how a gas or a liquid flows with the complications of various factors such as mass transfer (for eg. perspiration, dissolution), chemical reactions (for eg. combusting, rusting), phase change (for eg. melting, freezing, boiling) and many more[12]. CFD provides a qualitative prediction of fluid flows by means of three things: mathematical modelling (partial differential equations), numerical methods (discretization and solution techniques) and software tools (solvers, pre and post processing utilities).

CFD enables scientists and engineers to perform 'numerical experiments' (i.e. computer simulations) in a 'virtual flow laboratory'. It is based on the Navier-Stokes equations which describe how the velocity, pressure, temperature and density of a moving fluid are related. CFD had its first successes in the 1970s and its service industries started by around the 1980s. CFD is useful tool in the data center for analyzing thermal properties and modelling air flow. Since then, CFD has developed and has become an important part in various engineering and aerospace industries. In recent years, CFD modelling has been gaining attraction from the agro-food industry as well.

CFD software requires information about the size, content and layout of the data center. It uses a computer to solve the relevant science based mathematical equations, using information about the circumstances in question.

Its components are therefore:-

• The human being who states the problem
• Scientific knowledge expressed mathematically
• The computer code (i.e. software) which embodies this knowledge and expresses the stated problem in scientific terms
• The computer hardware which performs the calculations dictated by the software

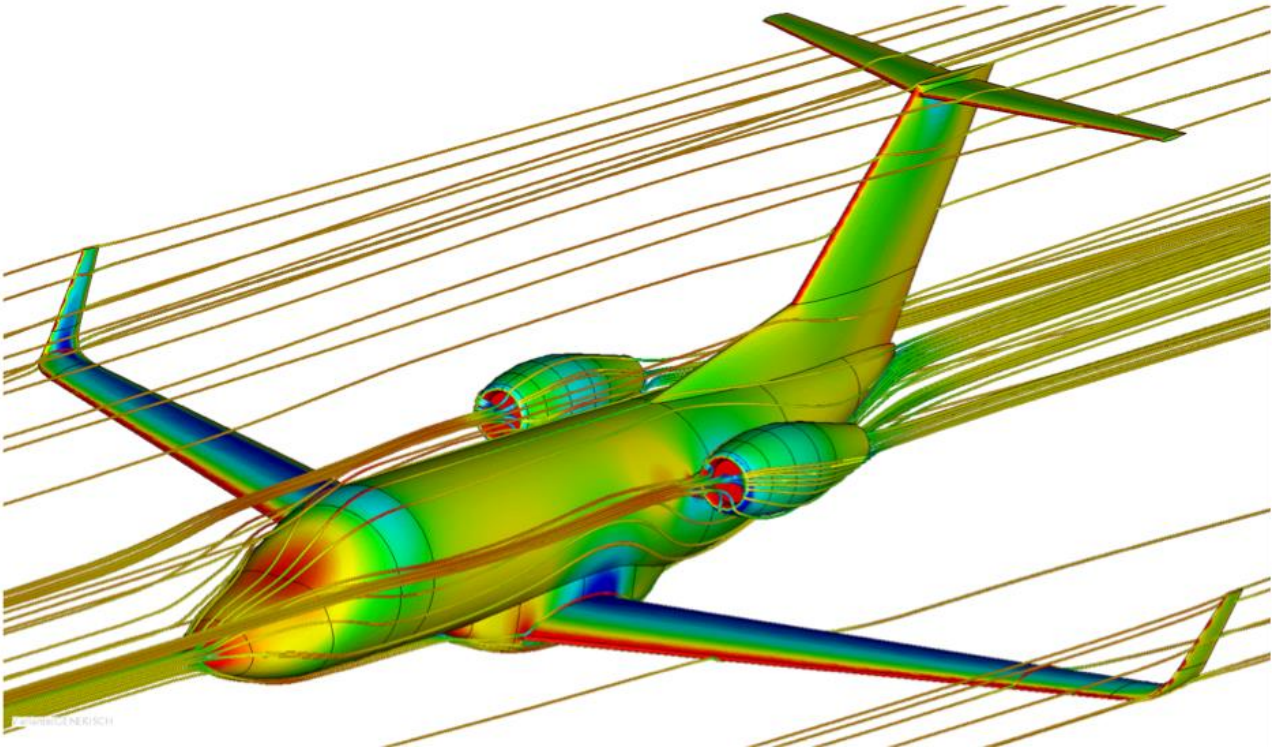
It uses this information to create a 3D mathematical model on a grid that can be rotated and viewed from different angles.

Being aware of the flow of fluids and there quantitative effects on the objects in the environment with which they are in contact, assists:-

• Power plant designers to attain maximum efficiency and reduce the release of pollutants;
• Chemical engineers to maximize the yields from their reactors and processing equipment;
• Building-services engineers and architects to provide comfortable and safe human environments;
• Risk and hazard analysts, and safety engineers, to predict how much damage to structures, equipment, human beings, animals and vegetation will be caused by fires, explosions and blast waves.

[12] http://whatis.techtarget.com/definition/computational-fluid-dynamics-CFD

CFD based flow simulations enable:-
• Designers of vehicles to improve the aerodynamic characteristics;
• Petroleum engineers to devise optimal oil recovery strategies, and the equipment for putting them into practice;
• Meteorologists and oceanographers to foretell wind and water currents;
• hydrologists forecast the effects of changes to ground-surface cover, of the creation of dams and aqueducts on the quantity and quality of water supplies In the near future, it is to be expected that surgeons will be able to conduct operations which may affect the flow of fluids within the human body (blood, urine, air, fluids within the brain) only after their probable effects have been predicted by CFD methods.



Source: https://www.termoflow.com/jobs/detail/bachelor-master-thesis-in-computational-fluid-dynamics-cfd-1

However, one must note that the results of a CFD simulation are never 100% reliable because
• the input data may involve imprecision
• the mathematical model at hand or the software may be inadequate
• the accuracy of the results is limited by the available computing power

To conclude, one must acknowledge the applications and importance of CFD and that it is a highly interdisciplinary research area which lies at the interface of physics, applied mathematics and computer science.

-Anand Nair

In Conversation with Prof Lee

Dr.Lee Kim Seng is an Associate Professor in the Department of Mechanical Engineering the National University of Singapore. Apart from his experience and vast knowledge in the field of engineering he also has a deep passion for organic farming. He keeps finding ways to improve farming techniques with the efficient use of science. Recently he along with three final year students were featured in a national newspaper for an aquaponics setup at the Eng Kong Cheng Soon community garden. Aquaponics combines aquaculture, the raising of edible fish, with hydroponics, growing vegetables without soil. This hybrid setup by the students allowed them to grow a wider variety of plants, which included 20kg of vegetables. Prof Lee shared his passion for farming with a few students from our school. He discussed his recent projects and various other things that he feels could improve the produce of the agricultural sector. Following is a small excerpt from the interview.

Q.What is the demand of organic food like in Singapore?
Well, people have started to realize that they are consuming slow poison by eating the inorganically grown fruits and vegetables. In fact there have been incidents where people have suffered because of the high amount of chemicals in the food. Taking all of this into consideration, the demand is definitely increasing. Although we have only few markets that sell fully organic stuff, we hope to increase the demand even further.

Q.What are the basic problems an organic farmer is likely to face?
An organic farmer, firstly, has to convert the old, chemically treated land into a fertile one. The cost of inputs is less compared to the conventional farming methods; so this is not at all a problem. Organic produce demands a lot of maintenance and care, otherwise it can rot fast. Farmers need to put in more labor to build an appropriate storage space. There is no end to problems but there is a solution to each one of them. These obstacles are too small compared to the large number of benefits organic food has. I, along with three final year students decided to grow plants through a technique called aquaponics.It is a system of aquaculture in which the waste produced by farmed fish or other aquatic creatures supplies the nutrients for plants grown hydroponically, which in turn purify the water. We were able to plant wide variety of plants like butter head lettuce, spring onion, beans, Chinese cabbage in the last two months.

So this is how the whole setup was done. A fish tank, filled with black African tilapia was connected to long grey pipes which had cutout holes in them. The seedlings of leafy vegetables were planted in net pots placed in these holes. Their roots dangled in the pipes

and absorb the nutrient-rich water flowing through. A plastic canopy that lets sunlight in, but keeps rain out shaded the entire set-up. The students built the system from scraps they found in their school's workshops. It took a few months to design and construct the 251 sq. ft system.

Q. How did this idea strike your head?
Well, there is a pretty interesting story behind this. One morning I saw heaps of garbage getting dumped into the wastelands. I believe that that every ting can be utilized, be it knowledge or garbage. So I just worked out a plan with the help of my amazing students and this is how we decided to set up an aquaponics. And of course, it would not have been possible without the students. We enjoyed it thoroughly and hope to expand it even further.
-Pratyusha Nyati

Charlottesville Riots

Hundreds of protesters descended upon Charlottesville, Virginia, on Saturday for a "Unite the Right" rally: a belated coming-out party for an emboldened white nationalist movement in the United States. The police dispersed the rally within minutes, but the after clashes between rally goers and counter-protesters broke into violent

riots.
Self-described "pro-white" activist Jason Kessler organized the rally to protest the planned removal of a statue of confederate general Robert E. Lee from a park in Charlottesville. Kessler is affiliated with the 'alt-right' movement that uses Internet trolling tactics to argue against diversity and "identity politics"(part of a broader cultural backlash that helped Donald Trump come into power).

The involvement of hate groups and the threat of violence led the city of Charlottesville to attempt marginalize the rally for "hate speech," but the American Civil Liberties Union (ACLU) defended the demonstrators' rights.
The "interesting" combination of protester and counter-protesters determined to convey that the protester's ideology was not welcomed in America, henceforth allowed the violence to overshadow the speech, and eventually prevented the rally from going forward.

"People just don't say 'one day I'm going to start a riot'. It doesn't happen this way. It's a long train of conditions and abuses and pent-up resentment and that's what we saw," quoted by Earl Ofari Hutchinson, a political analyst.

These LA riots brought into sharp focus the actions of the Los Angeles Police Department and its interactions with the city's ethnic minorities. Race relations throughout the country also came under the spotlight once more. "We have race problems in America, but all Americans don't have race problems. Some Americans get along quite good with everybody. But there are Americans that have these racial issues. When they put on a uniform and a badge it gives them a sense of power, they can do things that other people can't do. And that's why there's got to be a strict accountability. Police have to be held accountable when they violate rules, when they breach the standards of the law." said Hubert Williams, the president of the Police Foundation

Many people are puzzled over, the president Donald Trump's mealy-mouthed reaction to the sight of Nazi banners waving in the county. They were fretting about Mr. Trump's muted response to what appeared to be a political murder, as a car was driven at speed into a group of anti-racist marchers, leaving one woman dead and at least 19 injured. President Trump is rarely reluctant to express his opinion, but he is often seized by caution when addressing the violence and vitriol of White Nationalists, neo-Nazis and alt-right activists, some of whom are his supporters. Democrats have suggested that Mr. Trump is simply unwilling to alienate the segment of his white electoral base that embraces bigotry. The president has forcefully rejected any suggestion he harbors in context to any racial or ethnic animosities.

The question that arises here is that. Does the president of America sympathizes with white racists? Or at a minimum, does Mr. Trump believe the votes of white racists to be so important that he does not want to alienate them as a voting block?

Based on report from:
https://www.thesun.co.uk/news/4237245/charlottesville-donald-trump-protests/
http://www.news.com.au/world/people-search-for-meaning-of-words-fascism-bigot-and-racism-after-charlottesville-attack/news-story/30daba79fdad1c6bbd9d75625eefd5ec

The Venezuela Turmoil

Tension in Venezuela is on the rise again as the opposition and the government accuse each other of trying to stage a coup. There has been a wave of unrest in the country of Venezuela since April, as the opposition party has bombarded the country with dozens of anti-government protests, which has eventually taken lives of several innocent people. Venezuela has long been a divided country, consisting of Chavistas (followers of the United Socialist Party, PSUV) and the opposition party followers, who believe that the PSUV party has overthrown norms of democratic institutions. The Chavistas in turn accuse the opposition of being elitist and of exploiting poor Venezuelans to increase their own riches.

The government is furthermore troubled by the dropping oil prices, as oil accounts for about 95% of Venezuela's exports. The opposition said that the ruling has undermined the country's separation of powers and took Venezuela a step closer to one-man rule under President Nicolas Maduro. In this troubled state, the opposition has demanded for:

1) Removal from office of the Supreme Court justices who issued the 29 March ruling
2) General elections in 2017
3) Creation of a "humanitarian channel" to allow medication to be imported to counter the severe shortages in Venezuela
4) Release of all the "political prisoners"

Faced with almost daily protests, President Maduro probably felt he needed to make a move.

Not willing to give in to the opposition's demand for early presidential elections, he chose to announce the creation of a constituent assembly.

President Maduro says the opposition is trying to illegally overthrow his elected government and blames the country's problems on an "economic war" being waged against him. He argues that a new constitution will "neutralize" the opposition and defeat "coup-plotters" and thereby promote peace in Venezuela. The oppositions has not very surprisingly, denounced the move as an attempt by the president to maximize his power.

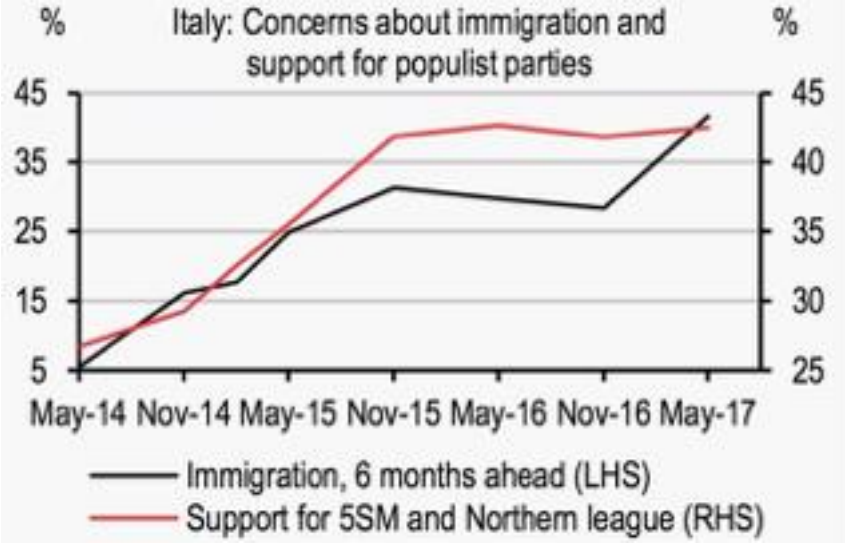
However, the humanitarian aspect of Venezuela crisis is extremely bad. Survey reports show that the average weight of a person is in a constant decline, hospitals have practically broken down, the inflation rates in Venezuela have never been so high in the previous four decades and its oil revenue has never fallen to such an extent.

Now lets throw some light on the International reactions to the ongoing turmoil, On Monday, President Donald Trump threatened to take "strong and swift economic actions" if Venezuelan President Nicolas Maduro proceeded with his plan to create a super-legislative body to rewrite the country's constitution. Despite those admonishments, Maduro has vowed to proceed, saying on Tuesday, "Here in Venezuela, Venezuelans give the orders, not Trump." Trump's administration officials have planned to target the energy sector of Venezuela to impose sanctions, as this could be a significant escalation of Washington's efforts to pressure the embattled Maduro government.

Based on reports from: http://www.bbc.co.uk/news/world-latin-america-36319877

The Migrant Crisis in Italy

The ever growing number of migrants to Europe, has fallen since the peak of the refugee crisis in the continent in 2015. Although the influx has subsidized overall, it remains acute in a country that is struggling economically: Italy. After an agreement to curb the flow of migrants from Greece, the route that goes through Italy has become more popular. Hence, Italy is said to be "bearing the brunt" of the migrant crisis in Europe. The vast majority of recent arrivals into Italy come from Africa, where the distinction between refugees and economic migrants is not clear-cut. The Italian government has been anxious about the massive amount of migrants coming into Italy as this could play into the hands of the populist anti-EU parties, when Italy gears up for general elections. The populist movements can lead to a referendum being held in Italy questioning the membership of the country in the European Union. Italy is Europe's third- largest economy, with public debt of $2.7 trillion and henceforth cannon afford to leave the EU. Reflecting the mood of the current scenario, the government of Italy has dispatched navy ships to Libyan waters, to help local forces deer boats from launching. A new rule also requires the rescue craft, run by NGOs in the Mediterranean region, to carry police on them to ensure that they are not abetting smugglers.



The number of migrants landed this year totals to more than 95,000 with about 2,000 who drowned, this crisis has defied nearly every attempt to solve it. Despite constant appeals and threats by Italy at EU meetings, neighboring countries seem to be least bothered. This has also has created differences between France and Italy as it has resisted migrants from Libya into France, worsening the problem in Italy.

The Italian government argues that smashing human trafficking networks and investing in Libyan mayors were the best way to stabilize a porous southern Libyan border. More than 40% of migrants at sea are now rescued by private aid, and the Italian government wants to make sure that ships rescuing migrants do not include human traffickers.

However, The Italian deployment in Libyan waters could effectively lead to arbitrary detention of people in abusive conditions and after years of saving lives at the sea, Italy is preparing to help Libyan forces, who are known to detain people in conditions that expose them to a real risk of torture, sexual violence, and forced labor. Such a move "could implicate Italy in human rights abuses", said Judith Sunderland, HRW's Europe and Central Asia associate director.

-Gaurika Anand

Based on the reports on: http://www.bbc.com/news/world-africa-40812304

Cryptograms

Cryptograms are sentences in a simple substitution code, where one letter of the alphabet is sub- stituted for the correct letter. No letter stands for itself. The code is different for each cryptogram. A cryptogram may be an original thought or a quotation, sometimes humorous and sometimes philosophical. It is always correctly punctuated. There are many things to look for to help break the code for each cryptogram. For example, single letters usually stand for I or A. Common two-letter words are OF, IN, IS, IT, AT, OR, and TO. Three-letter words are often THE, AND, ARE, and FOR. Look for common suffixes, for example, -ING, -ED, -TION, and -ABLE to end words. Note the frequency of the letters. The most frequently used letters in the English language, in order, are E, T, A, O, I, N, S, H, R, D. Always look for the basic form of the sentence (subject, verb, etc.) to help you proceed. Patience and persistence will be rewarded!

HAPPY PUZZLING!

FYNNW NSXXJGLE!

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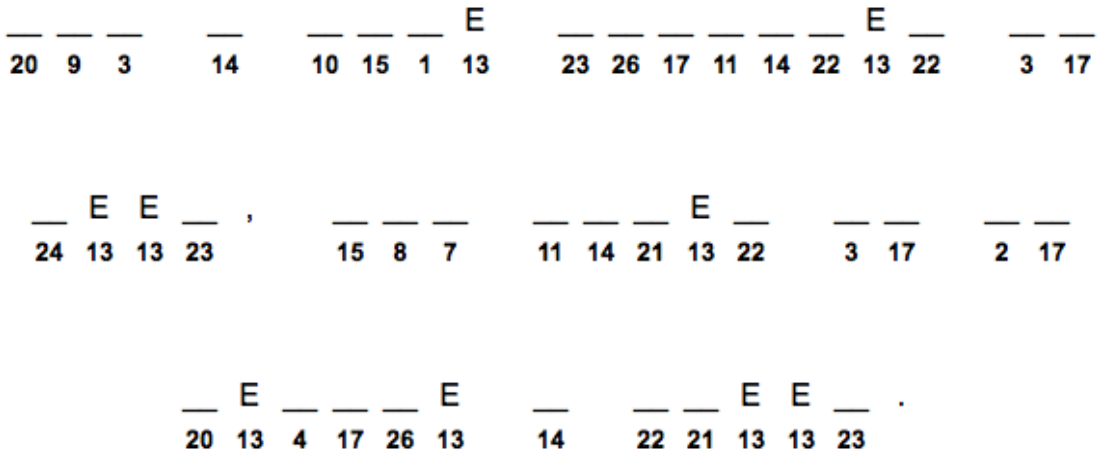

~ Robert Frost

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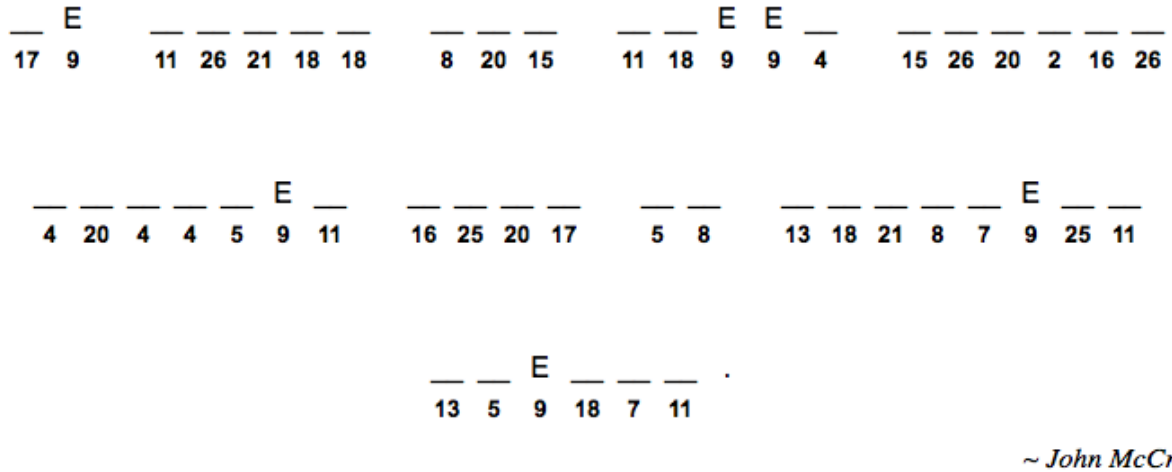

~ John McCrae

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-Shivam Mulchandani

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anushreegupta97@gmail.com