



VETRII IAS GATEWAY

www.vetriias.com

SCIENCE REPORTER

AUGUST 2018

INDEX

1. **Autonomous Car**
2. **Driest Place on Earth MC Murdo**
3. **Electric Vehicles**
4. **From Dolly to Zhong Zhong to Human Cloning**
5. **Fake News**
6. **Nutrify India Now - APP**
7. **Study on Hungul**

1. AUTONOMOUS CAR

- Driverless or self – driving cars are being tested by companies round the world. Technology pundits consider them as a paradigm shift in the human – automobile relationship.
- The car would have the capability to drive its passenger by automatic means through pre – set commands or self - instructional inputs.
- Driverless cars or self – driving vehicles are based on a very simple concept.
- A self – driving car is a vehicle that is capable of sensing its environment and navigating without human input and hence designed to travel between destinations without a human operator or driver.

Technology:

- All self – driving cars typically involve the same basic principle of operation. The driver or passenger sets a destination. The car's software calculates the route and starts the car on its way.
- After the driver sets the destination and the car starts, a rotating sensor mounted in the roof and other sensors attached elsewhere gets activated.
- Sensors generally consist of technologies like laser, radar and camera images.
- The lidar system maps the objects around the car in 3D and accurately pinpoints the car's location, which helps it create a picture of the car's surroundings.
- GPU interprets visual data coming from the sensors so fast, that there is no legal response in a real time.
- A sensor on the left rear wheel monitors the sideways movement.
- Radar sensor systems on the front and back calculates distances to the obstacles.
- Artificial intelligence software in the car is connected to all the sensors and also to the google street view.

VETRII'S UPSC SCIENCE REPORT

AUGUST - 2018

- AI based software forms the primary part of the car control system and is capable handling fuzzy logic system, plays a key role in three main functional areas of the car – perception, planning and control.

Pros:

- Driverless cars would either eliminate or decrease accidents caused by driver errors and thus save thousands of lives and prevent even more number of injuries arising out of road accidents.
- The greater precision of an automatic system would considerably improve traffic flow, which could ultimately increase road and highway capacity and reduce or eliminate traffic jams.
- The technology would allow car owners and commuters to do some extra work or job while travelling like reading, working or sleeping.
- This technology would ease the travel for physically disabled and old people.

Cons:

- Self – driving automobiles would leave a large number of jobs redundant and would thus pose a direct threat to driving jobs in the road transport industry.
- Safety concerns related to cyber security and loss of privacy.
- In case an accident occurs where a self – driving car is directly involved who would be held legally responsible for it.

Technology pundits consider them as a paradigm shift in the human – automobile relationship. When fully operational, they are set to become the game – changer, revolutionising the way we drive and commute.

2. DRIEST PLACE ON EARTH: MCMurdo

- The Mcurdo dry valleys of Antarctica are a row of snow free valleys located within Victoria land west of mcurdo sound.
- The dry valleys are Antarctic anomaly. While most of the continent being covered in a mile deep sheet of ice, the dry valleys are almost entirely ice - free and arid stretch of mostly dust, small rocks and big boulders.
- They exist due to the positioning of the Trans - Antarctic Mountain Range which force air flowing over them upwards so they lose their moisture, the valleys therefore are in a precipitation shadow (snow and rain doesn't fall).
- The mountains also prevent the flow of ice down the valleys from the East Antarctic Ice Sheet and finally, strong katabatic winds of up to 320km/h (200mph) blowing down from the interior along with the low humidity causes the ice from the glaciers that do discharge into the valleys to evaporate.
- They are one of the most extreme desert climates anywhere on earth, a cold desert where the mean annual temperature is between -14C and -30C depending on the site, windier sites are less cold.
- Endolithic photosynthetic bacteria have been found living in the relatively most interior of rocks in dry valleys. Summer meltwater from the glaciers provide the primary source of soil nutrients.
- Scientists consider this land is one of the places on earth similar to Mars. The two places have a lot in common. Water flows there and disappears, leaving micro-organisms behind in the remaining sediment. Mars may have a similar setup.

3. ELECTRIC VEHICLES

The government of India as a part of its commitment to reduce greenhouse gas emissions and also in view of the recurring episodes of high air pollution in major cities, has an ambitious plan to shift from petrol/diesel vehicles to electric vehicles both public and private use by 2010.

Electric Car:

- An electric car looks almost like a petrol or diesel car however the electric car produces much less noise and more importantly does not produce tailpipe emission.
- It converts the chemical energy stored in the battery to mechanical energy to turn the wheels of the car.

Analysis:

- The electric vehicle is pollution – free in the locality where it is driven, but may not be so at the global level.
- Most of the electricity is still generated by burning fossil fuels, which emit significant quantities of greenhouse gases that have different potentials for global warming.
- Production of lithium – ion batteries is energy and resource intensive.
- An electric vehicle is not entirely a zero emission vehicle, it is still far cleaner than a petrol vehicle.
- With the global tendency to move from fossil fuels to renewable energy resources to generate electricity, electric vehicles are favourable than conventional vehicles.

4. FROM DOLLY TO ZHONG ZHONG TO HUMAN CLONING?

Introduction:

The recent news about the successful cloning of monkeys by Chinese scientist grabbed media attention. In a research paper published in the journal cell scientist from the Chinese academy of sciences in shanghai announced the successful cloning of a pair of long tailed macaques Zhong Zhong and Hua Hua using DNA from foetal connective tissue cells, using somatic cell Nuclear Transfer (SCNT) technique, which was used to clone Dolly. Public attention in cloning got significance with the birth of Dolly in 1996 through the technique SCNT.

About SCNT:

1. The Nucleus is removed from an egg cell and is replaced with a different nucleus from another cell, usually a somatic cell.
2. The egg cell then merges with the implanted nucleus and develops into a clone of whatever it was that donated the nucleus.

Cloning from an Primate Cell:

- Dolly was important because she was the first mammal to be cloned from an adult cell because Dolly's DNA came from a mammary gland cell.
- The birth of dolly evinced interest among the scientist community to clone other potentially useful animals including Humans. it also initiated serious discussion on ethical issues unheard of till then.
- In 1999, a cloned rhesus monkey named tetra was born, but she was created through a less sophisticated method called Embryo splitting or Artificial twinning. Although it mimics the natural process through which twins are born, embryo splitting can only create 4 offspring at a time, limiting its usefulness.

VETRII'S UPSC SCIENCE REPORT

AUGUST - 2018

- The latest breakthrough through Zhong Zhong and Hua Hua allows for a near limitless production of clones. SCNT has proven to be difficult in primates until this news was broken by the Chinese team.
- Many species have been created but primate cells proved resistant. but the Chinese using cells from foetuses, they got 109 embryos from 137 tries, six pregnancies and two live births- both females and since they came from cells of the same monkey, identical twins.
- The success of the shanghai team became possible primarily due to two chemicals they used- trichostatin A and Kdm4d. Together they reprogrammed the donor DNA, awakening genes needed to produce an entire organism. That increased the percentage of SCNT eggs that developed into embryo's quality, making them more like naturally fertilised eggs. However the efficiency was still very low and they couldn't achieve success using adult cells.
- Monkeys have many similarities with humans both genetically and physiologically. this makes them better laboratory model animals compared to other animals like rats or mice, to understand human problems properly. For example, all the recent Alzheimer's medications that looked promising in mouse models haven't been in our species. Macaques , being much closer to us, could give a better indication as to whether or not new drugs would be effective in humans.

Way Forward:

The successful cloning of Zhong Zhong and Hua Hua has renewed interest in human cloning too.

5. FAKE NEWS

- Fake news has now become a worldwide phenomenon that has found greater traction with the swamping of traditional media outlets by social media channels.
- While communication is the only route to progress, inappropriate communication could harm. And fake communication could even be fatal, as the country has been discovering much to its discomfort in recent times.

What is Fake News:

- Fake news is a fabricated information that mimics news media content in form but not in organizational process or intent.
- Fake news outlets, in turn, lack the news media's editorial norms and processes for ensuring the accuracy and credibility of information.
- Fake news overlaps with other information disorders, such as misinformation (false or misleading information) and disinformation (false information that is purposely spread to deceive people).

Impact:

- Fake and provocative messages on social media channels have led to the killing of several persons, even creating communal disturbances and riots at times.
- Fake news has not left the world of science untouched too with areas like health and nutrition being the most targeted ones such as vaccination, nutrition, and stock values.
- If news is "fake", it misinforms the public and democratic debate is polluted at the source.

Measures Taken:

- Concern over the Fake news is a global issue.
- The government of India has even called on WhatsApp to put a system in place to stop divisive and dangerous messages from being circulated in large numbers.
- The gravity with which the problem is being viewed around the world can be gauged from the slew of parliamentary measures being adopted by countries.

VETRII'S UPSC SCIENCE REPORT

AUGUST - 2018

- While the German parliament adopted in June 2017 a law against the posting on social media of hate speech, child pornography, terror-related items and false information, 14 draft laws related to fake news are being examined in the Brazilian Parliament.
- Two draft laws are also under discussion in the French Parliament while the Malaysian Parliament in April 2018 approved a law punishing the propagation of partially or totally false information with prison sentences and fines.
- Of course, tackling false or fake news through legislation is a red herring for rights activists and critics who argue such measures could stifle press freedom.
- Educating the consumers of fake news then is a measure that needs to be strengthened. Brazil has already moved ahead in this direction by making media analysis studies compulsory for school children.
- Brazilian education specialists say ways and methods of identifying fake news have now been incorporated into the national curriculum. Students are being educated on the need and methodology of critically examining and analysing news they receive through various Internet channels. They are being taught not to consume news without questioning the information.

Way Forward:

- In India too we need to realise that media and technology literacy are today of paramount importance. School children in India need to be taught skills of analysis and critical examination, in general, but also specific to information streaming in through social media channels where the absence of gatekeepers of reviewers or editors could easily let incorrect or inappropriate information slip through.
- Educationists and teachers would do well to inculcate media and information analysing skills in school children through structured teaching programmes. An army of young foot soldiers in the war against fake news could be a welcome dividend in the days to come.
- Structural changes aimed at preventing exposure of individuals to fake news should be taken.
- Empowering individuals to evaluate the fake news they encounter.

6. NUTRIFY INDIA NOW-APP

The Indian Council of Medical Research (ICMR's) & Hyderabad-based National Institute of Nutrition has launched a mobile App that offers comprehensive nutrition related information on a wide range of Indian food articles as part of its on-going centenary celebrations.

The App is based on authentic and well researched India-specific databases and uses guidelines prescribed by ICMR.

About:

- It will now be easier for diabetics, heart patients and those who are on diet to figure out how much calories they are consuming while eating Indian food.
- It provides information on several parameters such as protein, vitamin and mineral content of the food items, besides their calorific value.
- The App has also the facility to keep track of the energy balance, between calories consumed and expended.
- It has a facility to search for food articles and recipes by language or food groups, One can search in as many as 17 languages and six food groups are covered.
- The users can also search foods by nutrients, which enables to look up for the foods that are rich in nutrients of their interest.
- Will act as the user's personal nutrition advisor literally keeping track of what the user is eating and also as a ready reckoner on nutrient information on raw food and recipes.

7. STUDY ON HUNGUL

A new study has suggested that for long-term conservation of the critically endangered red deer or hangul in Kashmir, it is necessary to take up conservation efforts beyond protected areas.

Reason for loss:

India has witnessed unprecedented loss of species due to human action in recent times.

The lack in implementation of scientific monitoring programme to track the population response under rapidly changing scenarios has left no information to take corrective measures in time.

Habitat:

- The endangered Hangul's range in Kashmir lies between Zaskar and Pir-Panjal mountain ranges.
- The other subspecies of Red Deer *Cervus elaphus wallichi* (Shou), which used to occur in the mountains of East Sikkim, is now extinct.
- Hangul assumes great significance as the only survivor of Red Deer in the Indian subcontinent.
- Historically, Hangul range was restricted to an arc of 65 km in width; north and east of Jhelum, and lower Chenab river, from Shalurah in the north to Ramnagar in the south.
- A small population existed outside Jammu and Kashmir in the Chamba district of Himachal Pradesh which is now extinct.
- Hangul population has declined considerably in their existing distribution range.
- The present situation can be attributed to a large scale biotic interference, habitat fragmentation and degradation.
- In its present range, a demographically viable population of Hangul occurs only in Dachigam National Park.

VETRII'S UPSC SCIENCE REPORT

AUGUST - 2018

Way Forward:

- There is a need to adopt robust sampling methods to establish the trends in the Hangul population.
- Monitoring programme for species should be based on appropriate scientific design, inclusive of detection probabilities for individuals
- The population trend indicate decline of 5 percent / annum. There is an urgent need to establish captive breeding facility for long term conservation similar to the process done in Kanha for the Barasingha.
- It's important to monitor and evaluate factors responsible for decline in Hangul population.
- Future conservation efforts for the hangul therefore are required to be multifaceted and implemented at a landscape level considering the surviving relict populations. Adequate protection and eradication of all anthropogenic threats, in particular, grazing would make more habitats available for population growth.
- Grazing has in recent times emerged as a major threat to hangul in Dachigam .This therefore calls for a concerted grazing policy, keeping the interests of wildlife and livestock farming in mind
- The population and distribution range of Hangul is getting impacted by change in habitat quality, low recruitment, predation pressure and anthropogenic pressure.
- Protection, landscape level population management, and conservation breeding programme is imperative for long term hangul conservation in Kashmir.
- Genetic isolation and inbreeding risks are important factors that are implicated in the risk of local extinction.
- Long-term conservation focus on hangul has been confined only to the Dachigam population, and a majority of these sites have lost populations substantially over recent.

VETRII'S UPSC SCIENCE REPORT

AUGUST - 2018

-
- Study also highlighted a steady population decline at around 5% per annum in the Dachigam population. Such a situation of geographic isolation poses high risks of local extinction due to inbreeding bottlenecks and such as disease outbreak.
 - The availability of sufficient suitable habitats to facilitate re-colonization.