MAGAZINE FLIPBOOK

TECHSCIENCE

By the IT Department

SH 2020

The Journey of Apple, Sixth Sense Tech, Cybercrime, AND MUCH MORE!
Everything you need to know in one Magazine.

LATEST NEWS!

Boston Dynamics wows us again, SolarWinds hacked - know the whole story and its circumstances!

SCIENTIFIC FEATS!

Asteroid Treasures and Detecting Galaxy Collisions for the very first time and it doesn't stop there! Check it out!

WHAT'S NEW?

No more needles for diagnostics and the Zodiac Cipher solved!
Look inside to know more.

TechScience Edition Tribute

**Mathematician
John F. Nash Jr.**

7 VSCode Extensions for Python Enthusiasts Inside!

Department of Information Technology

Vision

To develop IT professionals for accomplishment of industrial & societal needs through quality education.

Mission

1. To impart advanced knowledge and develop skills in Information Technology and allied fields.
2. To enhance professional competence by inculcating values and ethics.
3. To upgrade technical skills and also encourage research culture.
4. To extend industry and alumni association for knowledge enhancement.
5. To nurture entrepreneurial talent and contribute towards socio-economic growth.

Program Educational Objectives :

Graduates will be able to:

1. Compete in professional career with social and ethical responsibilities.
2. Pursue higher studies / research in Engineering & Management.
3. Become Entrepreneurs or software professionals to satisfy the latest Industrial requirements.

Program Specific Outcomes:

1. Students should be able to analyze, design and develop technological solution for a given scenario.
2. Students should be able to involve themselves in life-long learning and cultivate skills for successful career, entrepreneurship and higher studies.

A Note from the HOD-IT

It gives me immense pleasure to inform you that the department of Information Technology is bringing out a new version of the Department Magazine T E C H S C I E N C E. This magazine is a perfect blend of articles related to advanced technologies. I am very happy to convey my congratulations to the team members in bringing out this wonderful magazine.

ACKNOWLEDGEMENT

Hello ! Welcome to the SH 2020 Edition of the TechScience Magazine.

TechScience is aimed at providing you with news and info related to amazing things happening in our world related to Technology and Science.

It is an initiative taken by the IT Department of SIES Graduate School of Technology, Nerul, Navi Mumbai.

This edition of SH 2020, is an effort of the faculty and 12 TE IT students! We're grateful to our HoD, Dr. Lakshmisudha for providing us with the opportunity and initiative and Prof. Bushra Shaikh, for being a constant mentor and guiding us in every step.

We hope you enjoy this edition and feel free to get back to us for any queries, suggestions, feedback, etc.

- Team TechScience SH 2020

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Boston Dynamics New Feat
When Atlas, Spot and Handle dance better than you!

Article by,
Arfah Upade, 4 Feb 2021

Boston Dynamics over the years has been involved in manufacturing Quadrupedals, i.e. four-legged robots. The fact that makes their robots stand out is how efficient they've made them perform.

Building a robot requires efforts directed in multiple areas, starting from components, motion, sensing, intelligence, speed, object detection, obstacle avoidance, stability, being able to handle uneven terrains, water - temperature resistance, load resistance, remote operation, etc.

Boston Dynamics has always wowed audiences with how wonderfully they've managed to get their robots, Atlas, Spot, Handle, and Pick, so effortlessly fulfill the requirements almost making it seem easy to build a robot.

ATLAS
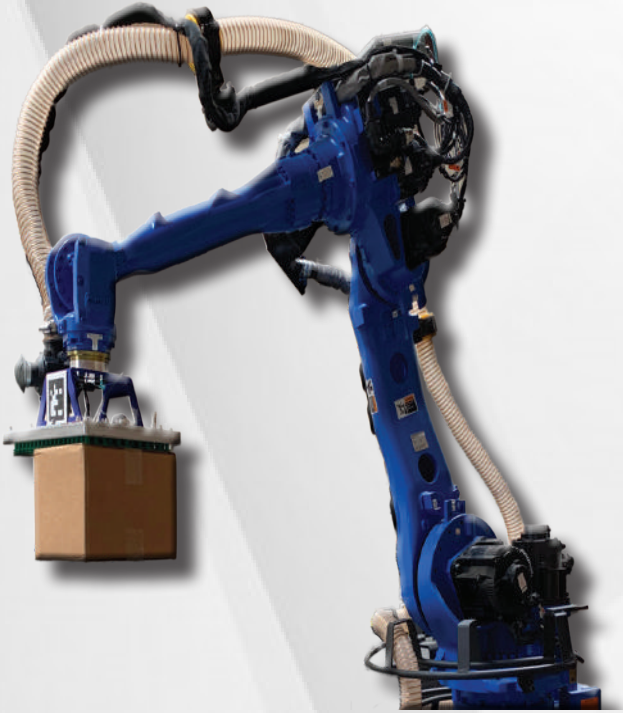*A research venture in creating the world's most dynamic humanoid.*

SPOT
The mobile robot designed for sensing, inspection, and remote operation.

HANDLE
The mobile manipulation robot for moving boxes in the warehouse.

PICK
The vision processing solution that uses deep-learning to enable building and depalletizing of mixed-SKU pallets.

Now just before 2021 began, Boston Dynamics dropped a new video on their YouTube channel, on 30 December 2020, which showed that the robots not only can be used for work but also to have great fun!

In the video, one can see Atlas dancing to "Do you love me? by The Contours", after which another Atlas, Spot, and Handle enter the scene and start dancing to the groove too.

What is so remarkable about this video is how it shows the seamless motion of components of the robots being achieved. Another really impressive thing is to see how the robots were able to remember the dance routine. The video is a great way that Boston Dynamics uses to portray their progress so far in a way that people will both, love and enjoy watching it.

Words won't be enough to describe this new feat. Have a look at the video by clicking or scanning QR code below!

Did you know?

Hyundai bought Boston Dynamics on 11 December 2020, from SoftBank, for nearly $1 Billion intending to increase growth potential and a wide range of capabilities.

To Know More

You can visit:
- *Website: https://www.bostondynamics.com*
- *YouTube Channel: https://www.youtube.com/user/BostonDynamics*

Zodiac Cipher
Solved after 51 years

Article by,
Melvina Michael, 3 Feb 2021

Zodiac cipher also called Zodiac 340. It is so named as it contains 340 characters. It is a coded message sent by an unidentified brutal serial killer(Zodiac killer) ,that has been cracked more than 51 years after it was sent. This unidentified American serial killer is believed to have murdered at least five people in northern California between 1968 and 1969. In the first three attacks, he targeted couples. The first two murder victims were high school students who were parked in a car. In attacks on the other two couples, he managed to kill the women, but the men survived. A male San Francisco cab driver was the last known victim to be killed.
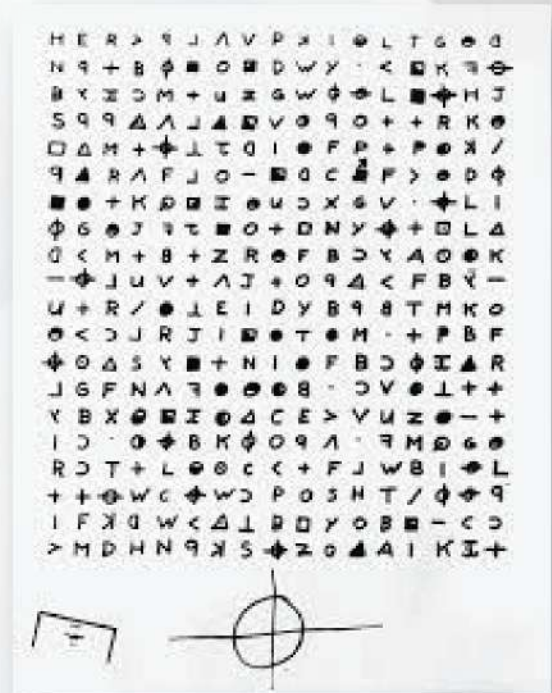
DID YOU KNOW?

▶ *He may have served in the military*

▶ *he had a sophisticated understanding of maps.*

▶ *The Zodiac took credit for crimes he did not commit.*

▶ *The Zodiac investigators did not cooperate in solving the case.*

▶ *His identity remains unknown until todayclaimed to have killed 37 people DNA analysis might eventually solve the case. Same kind of spelling mistakes (paradice instead of*

During the murder spree, the Zodiac Killer sent media outlets a series of letters taking credit for the slayings.- To prove the authenticity of the claim-s, the letters included unreleased details and evidence from the crime scenes. The killer went on to threaten the media if the letters weren't print-ed on the front page of the papers, he would continue with further attacks . The Zodiac himself once claimed to have murdered 37 victims, and he has been linked to several other cold cases

The cipher, sent in a letter to 'The Chronicle' in November 1969, has been puzzling authorities and ama-teur sleuths since it arrived 51 years ago. Investigators hoped the Zodiac, who killed five people in the Bay Area in 1968 and 1969, would reveal his-name in one of his many ciphers, but there is no such name in the 340.

THE COSTUME OF THE KILLER

SOLVED!

" I HOPE YOU ARE HAVING LOTS OF FUN IN TRYING TO CATCH ME THAT WASN'T ME ON THE TV SHOW WHICH BRINGS UP A POINT ABOUT ME I AM NOT AFRAID OF THE GAS CHAMBER BECAUSE IT WILL SEND ME TO PARADICE ALL THE SOONER BECAUSE I NOW HAVE ENOUGH SLAVES TO WORK FOR ME WHERE EVERYONE ELSE HAS NOTHING WHEN THEY REACH PARADICE SO THEY ARE AFRAID OF DEATH I AM NOT AFRAID BECAUSE I KNOW THAT MY NEW LIFE WILL BE AN EASY ONE IN PARADICE DEATH."

HOW IT WAS SOLVED?

David Oranchak describes that the message in the 340 was split into 3 sections by the zodiac and probably rearranged by manipulating triangu-lar sections cut from messages writ-ten into rectangles "Oranchak and his colleagues developed an app(AZde-crypt) that helped him and his col-leagues unravel the puzzle. Oranchak said he has been working on and off on solving the 340 since 2006.

Resources:
- *Newyork Times - https://www.nytimes. com/2020/12/11/us/zodiac-killer-code-bro-ken.html*
- *Biography - https://www.biography.com/ news/zodiac-killer-murder-identity*
- *Youtube - https://www.youtube.com/ watch?v=d64_OkthWOUwatch?v=d64_Ok-thWOUthWOU*

Python Enthusiast?

7 essential VS code extensions for python developers 2021

Article by,
Vanitha Reddy, 3 Feb 2021

Microsoft's IDE, Visual Studio Code (VSCode) is among the most popular code editors for software developers. Every mainstream programming language, right from Python to Rust is supported in VS Code. Python is among the most popular programming languages that work very well within VSCode. Here are seven extensions to improve your Python coding experience in VS Code 2021.

1. Python

It provides functionalities such as:

- Linting: Get additional code analysis with Pylint, Flake8, and more
- Code formatting: Format your code with black, autopep or yapf
- Debugging: Debug your Python scripts, web apps, remote or multi-threaded processes
- Testing: Run and debug tests through the Test Explorer with unittest, pytest, or nose.
- Environments: Automatically activate and switch between virtualenv, venv, pipenv, conda, and pyenv environments

- Refactoring: Restructure your Python code with variable extraction, method extraction, and import sorting.

2. Python Snippets

An extension consisting of in-built snippets, suitable for beginners developed by Ferhat Yalçın. Strings, lists, sets, tuples, class, etc are a few in-built snippets.

3. Python Docstring Generator
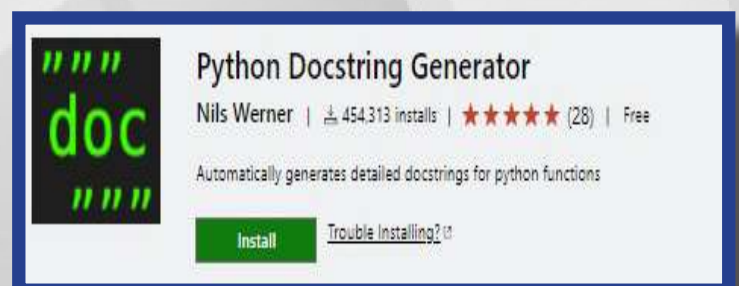
Quickly generates docstrings for python functions. It helps choose between several different types of docstring formats and provides support for args, kwargs, decorators, errors, and parameter types.

The following are the supported Docstring Formats

- Google (default)
- docBlockr
- Numpy
- Sphinx

4. Python Test Explorer for VS Code

The Python Test Explorer extension allows you to run your Python unittest or Pytest tests with the Test Explorer UI.

Some Notable features As follow:

- Test Explorer in the Test view in VS Code's sidebar with all detected tests and suites and their state
- Convenient error reporting during test discovery
- Supports multi-root workspaces
- Supports Unittest and Pytest test frameworks and their plugins
- Shows a failed test's log when the test is selected in the explorer
- Shows only relevant folders from your workspace unlike python extension where issue may arise when you have multiple workspace folders, but only a couple of them have any tests.

5. Python Preview

It is an extension that transforms your code into an interactive session with added animations and graphic elements.

6. Python Type Hint

Provides type hint auto-completion for Python, with completion items for built-in types, classes and the typing module. Moreover, it can search for Python files in the workspace for type estimation purposes.

Features as follows:

- Provides type hint completion items for built-in types, estimated types and the typing module.
- Estimates the correct type to provide as a completion item.
- Can search Python files in the workspace for type estimation purposes.

7. Jupyter
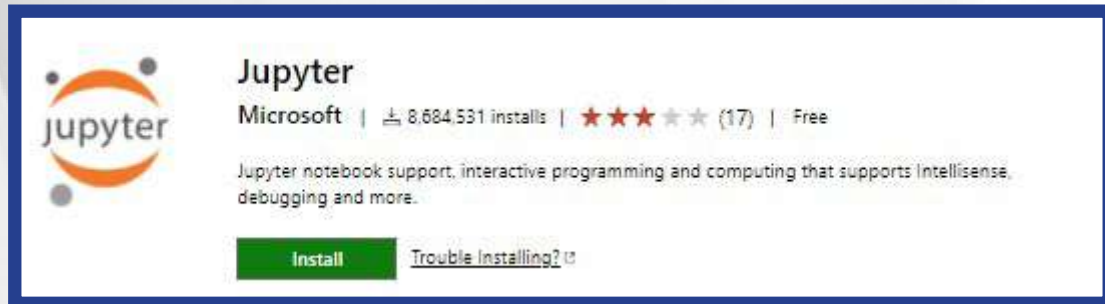
Features as follows:

- IntelliSense: Edit your code with auto-completion, code navigation, syntax checking and more!
- Jupyter Notebooks: Create and edit Jupyter Notebooks, add and run code/markdown cells, render plots, create presentation-friendly versions of your notebook by exporting to HTML or PDF and more!

Fun Facts

- **Python was a hobby project**
  In December 1989, Python's creator Guido Van Rossum was looking for a hobby project to keep him occupied in the week around Christmas. He had been thinking of writing a new scripting language that'd be a descendant of ABC and also appeal to Unix/C hackers. He chose to call it Python.

- **Nomenclature fact of Python**
  This name "Python" is extracted from a British comedy series, "Monty Python's Flying Circus". It was named on a snake. It is said that this was the favorite series of its inventor Guido Van Rossum. He named it Python because it is short, mysterious and unique

No More Needles for Diagnostic Tests!
Engineers Develop Nearly Pain-Free Microneedle Patch

Article by,
Rabiya Idrishi, 3 Feb 2021
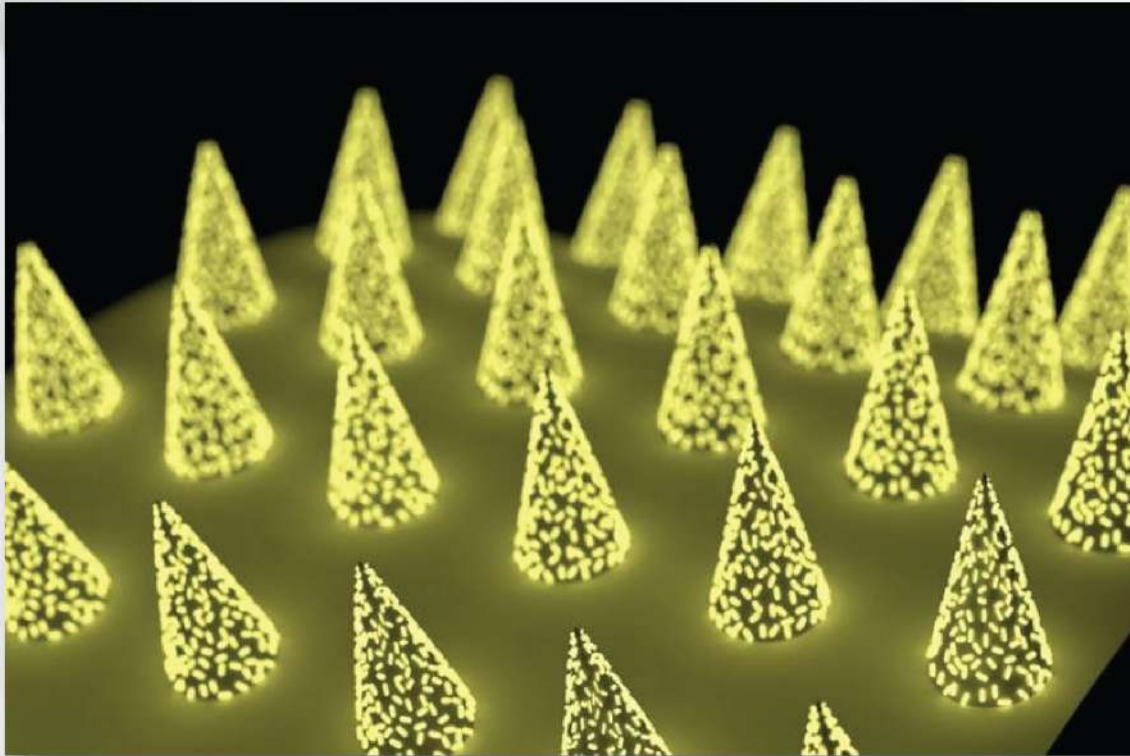
Blood draws are no fun. They hurt. Veins can burst, or even roll — like they're trying to avoid the needle too. Oftentimes, doctors use blood samples to check for biomarkers of various diseases. These biomarkers aren't just in blood though. They can also be found in the dense liquid medium that surrounds our cells, but in a low abundance that makes it difficult to be detected. Until now.

Engineers at the McKelvey School of Engineering at Washington University in St. Louis have developed a microneedle patch that can be applied to the skin, capture a biomarker of interest and, thanks to its unprecedented sensitivity, allow clinicians to detect its presence.

HOW IT WAS SOLVED?

The team had a secret weapon of sorts: "plasmonic-fluors," an ultra bright fluorescence nano label.

Compared with traditional fluorescent labels, when an assay (the testing of a metal or ore to determine its ingredients and quality) was done on a microneedle patch using plasmonic-fluor, the signal of target protein biomarkers shined about 1,400 times as bright and became detectable even when present at low concentrations.

These patches have a host of qualities that can make a real impact on medicine, patient care and research. They would allow providers to monitor

became detectable even when present at low concentrations.

These patches have a host of qualities that can make a real impact on medicine, patient care and research. They would allow providers to monitor biomarkers over time, particularly important when it comes to understanding how immunity plays out in new diseases.
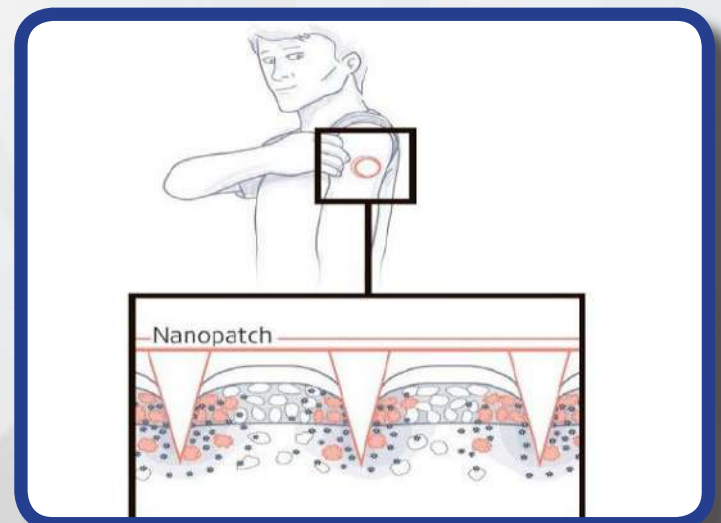
They could be used to check the amount of antibodies produced in a COVID patient. For people with chronic conditions that require regular monitoring, microneedle patches could eliminate unnecessary trips to the hospital, saving money, time and discomfort — a lot of discomfort.

The research, from the lab of Srikanth Singamaneni, the Lilyan & E. Lisle Hughes Professor in the Department of Mechanical Engineering & Material Sciences, was published online on January 22, 2021, in the journal Nature Biomedical Engineering.

In addition to the low cost and ease of use, these microneedle patches have another advantage over blood draws, perhaps the most important feature for some: "They are nearly pain-free". They go about 400 microns deep into the dermal tissue and don't even touch sensory nerves. In the lab, using this tech-

nology could limit the number of animals needed for research.

Finding a biomarker using these microneedle patches is similar to blood testing. But instead of using a solution to find and quantify the biomarker in blood, the microneedles directly capture it from the liquid that surrounds our cells in skin, which is called dermal interstitial fluid (ISF). Once the biomarkers have been captured, they're detected in the same way — using fluorescence to indicate their presence and quantity.

Resources:

- *TED Blog- https://blog.ted.com/7-ways-scientists-are-attempting-to-move-beyond-needles/*
- *Nature Biomedical Engineering, 2021; 5 (1): 64 DOI: 10.1038/s41551-020-00672-y*
- *DOI Org - Website*

GALAXY COLLISION!
Detected for the very first time

Article by,
Vanitha Reddy, 3 Feb 2021

A picture from the Hubble Space Telescope shows what happens when two impact. That is significant for us inhabitants of the Milky Way, in light of the fact that our own system is slated to bang into the close by Andromeda galaxy in around four billion years. Situated in the constellation of Hercules,NGC 6052 is a pair of colliding galaxies which is around 230 million light-years away. They were first found in 1784 by William Herschel and were initially called as a solitary irregular universe as a result of their odd shape. Nonetheless, we presently realize that NGC 6052 really comprises of two universes that are currently colliding. This specific picture of NGC 6052 was taken utilizing the Wide Field Camera 3 on the NASA/ESA Hubble Space Telescope."A long time ago, gravity drew the two galaxies together into the chaotic state we now observe," European Space Agency (ESA) officials wrote in a description of the new photo. (Hubble is a joint mission of NASA and ESA.).

The stars present in the original galaxies adhere to new course of direction brought about by the new gravitational effects. Nonetheless, genuine crashes between stars themselves are exceptionally uncommon as stars are tiny when compared with the distances between them. Ultimately the galaxies will completely converge to shape a solitary, stable galaxy.

Hubble Telescope

DID YOU KNOW?

▸ **Hubble is 13.3 meters (43.5 feet) long — the length of a large school bus.**
▸ **Hubble has made more than 1.3 million observations since its mission began in 1990.**
▸ **Hubble does not travel to stars, planets or galaxies. It takes pictures of them as it whirls around Earth at about 17,000 mph.**

Hubble is required to continue to work all the way into the 2020s. The James Webb Space Telescope, successor to Hubble, estimated to be about $8.9 billion is planned to be launched in 2021.

Quiz Time

How much do you know about Apple?

1. What year was first iPhone released?

a). 2000　　　　　b). 2005

c). 2007　　　　　d). 2010

2. What is the title of Apple store Employee?

a). Experts　　　　b). Appleoids

c). Geniuses　　　　d). Clones

3. What year was first iPad released?

a). 2008　　　　　b). 2010

c). 2012　　　　　d). 2014

4. What is the name of Apple's artificial Intelligence assistance?

a). Samantha　　　b). Saara

c). Siri　　　　　d). Suzy

5. Which Apple product is more popular?

a). Macbook　　　b). iPhone

c). iPad　　　　　d). iPod

6. How many iPhone models released as of 2018?

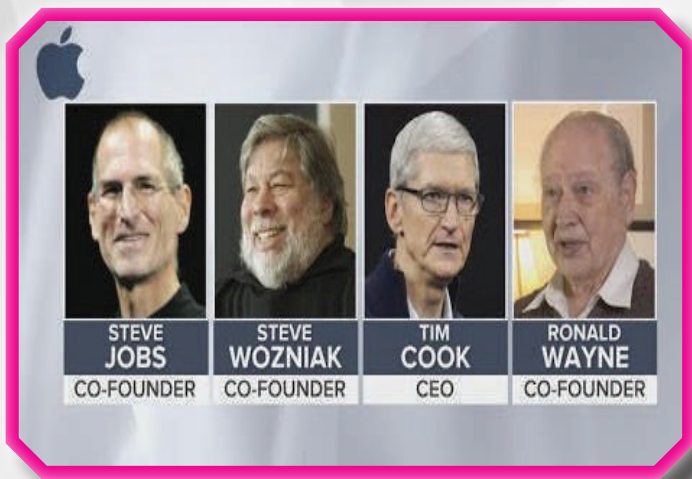a). 15　　　　　　b). 20

c). 18　　　　　　d). 23

Answers given on the Last Page.

The Journey of Apple
An Odyssey from 2K$ to 1Trillon$

Article by,
Vaishnavi Mantri, 2 Feb 2021

Apple Inc. is an American multinational technology company headquartered in California, that designs, develops, and sells consumer electronics, computer software, and online services. It is considered one of the Big Five companies in the U.S. information technology industry, along with Amazon, Google, Microsoft, and Facebook.

Apple's first computer Apple 1

grew quickly. In the year 1980, Apple went public selling 4.6 million shares at $22 per share generating over $100 million, which was more than any other capital in the world during that time.

ERA 1984–1991

Success with Macintosh:

In 1984, Apple launched the Macintosh, the first personal computer to be sold without a programming language. Macintosh sales were initially good, but began to taper off dramatically after the first three months due to its high price, slow speed, and limited range of available software. Apple believed the Apple II series was too expensive to produce and took away sales from the low-end Macintosh. In 1990, Apple released the Macintosh LC, and began efforts to promote that computer by advising developer technical support staff to recommend developing applications for Macintosh rather than Apple II,

ERA 1976–1984

Foundation and Incorporation of Apple:

Apple was founded by Steve Jobs, Steve Wozniak, and Ronald Wayne in April 1976 to develop and sell Wozniak's Apple I personal computer. It was incorporated as Apple Computer in 1977, and sales of its computers, including the Apple I and Apple II,

ucts during the 1990s, including digital cameras, portable CD audio players, speakers, video consoles, and TV appliances. Ultimately, none of these products helped and Apple's market share and stock prices continued to slide.

ERA 1997–2007

Many product launched from 1997 to 2007

Return to profitability:

In the year 1997, Apple introduced the Apple Store website. In the year 1998, Apple also introduced a new all-in-one computer reminiscent of the Macintosh 128K: the iMac. The iMac featured modern technology and a unique design, and sold almost 800,000 units in its first five months. In the year 2001, Apple opened its first official eponymous retail stores in Virginia and California. On October 23 of the same year, Apple debuted the iPod portable digital audio player. The product first sold in the year 2001, was phenomenally successful with over 100 million units sold within six years. In 2003, Apple's iTunes Store was introduced. The service offered online music downloads for $0.99 a song and integration with the iPod.

Apple II

The Apple II was discontinued in 1993.

ERA 1991–1997

Decline and Restructuring:

During this era there was a success of Apple's lower-cost consumer models, so the company introduced several new brands, and started selling largely identical machines at different prices at different markets.. This led to significant market confusion, as customers did not understand the difference between models. Apple also experimented with a number of other unsuccessful consumer targeted prod-

Apple PenLite Prototype (1992)

ERA 2007-2019

Success with Mobile Devices:

As the iTunes Store was developed by the end of the previous era, at the start of this era it quickly became the market leader in online music services, with over five billion downloads by June 2008. Two years later, the iTunes Store was the world's largest music retailer. In 2011, Apple Inc. became the most valuable company in the world. The same year the company lost Steve Jobs, its founder, visionary, and leader. It also started development of various mobile devices and its various versions and saw a huge success rate from 2012 to 2019.

Apple's First iPhone

Present

2020 and During COVID:

Apple's market capitalization reached new highs in 2020, as the company enjoyed some successes and set new goals for the future. The company's revenue from wearable technology, such as the Apple Watch,

set new records. Apple's revenue from services also rose to record highs during the coronavirus pandemic, vas contactless payment options like Apple Pay became more popular. Apple

Apple's Latest iPhone 12

also announced two major changes to the Mac in 2020. First, Apple is transitioning the Mac away from Intel processors to its own custom-designed chips. Apple's new processors are based on the ones used in iPhones and iPads, making them more energy-efficient. The new chips have the potential to give Apple's laptops longer battery life and more processing power than PCs.

Secondly, Apple is changing the macOS so that developers can make iOS and iPadOS apps run on the Mac without modifications. That will dramatically expand the number of apps available on the Mac and make it more competitive with PCs.

Apple India reports 29% rise in revenue at Rs 13,756 cr in FY20. According to research firm Canalys , the tech giant's renewed focus on India paid off with a double-digit growth to nearly 8,00,000 units in the region during the July-September 2020 quarter. Thus it saw a great rise in the year 2020.

Can We Stop Time?

Scientists say yes, by using Quantum Algorithms.

Article by,
*S. Ananthaselvi, 4 Feb 2021*

Studies on quantum algorithms, from different independent research teams recently enhanced arXiv preprint servers - basically means using clever algorithms to solve nonlinear differential equations. And these concepts can be used by computers that can basically stop time in order to solve a problem requiring a near-immediate solution.

Linear equations are the bread-and-butter of classical computing. But nonlinear differential equations are hard or impractical for even the most powerful classical computers to solve.

Hope is that these harder problems will be solved by quantum computers and make them an ordinary computing task in future. By doing so, here we come across a concept of future prediction. Today's AI in classical computers is a best example. Just give enough data and predict the future. But if we jump on the concept of interactivity, such as when observing particle interactions, the classical computers fail to deal with physics at that scale.

As quantum researcher Andrew Childs told Quanta Magazine, is why we can't predict the weather. There's just too many particle interactions for a regular old computer to follow.
But quantum computers can overcome this disadvantage of classical computers.
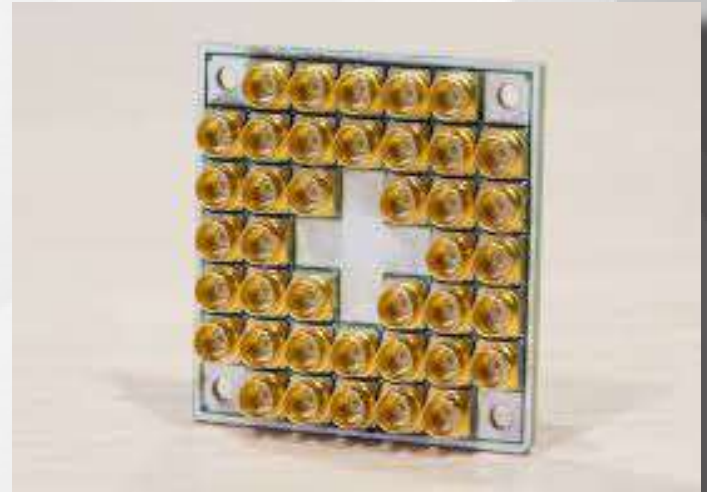
Intel Quantum Chip

A powerful-enough quantum computer running the difficult algorithms being developed today may one day be able to functionally assess particle-level physics with enough speed and accuracy to make the passage of time a non-factor in its execution.

So theoretically, someone can stop time. For less interesting use cases, one can predict weather conditions accurately for a long period of time

This ultimately means quantum computers could one day operate in a functional time-void, solving problems at nearly the exact infinitesimally-finite moment they happen.

Asteroid treasure

Thrilling return of Hayabusa-2 Spacecraft

Article by,
Melvina Michael, 2 Feb 2021

Japan's Hayabusa2 spacecraft successfully landed in the Australian Desert after spending nearly 1½ years in the asteroid Ryugu. The spacecraft along with a small capsule from Outback containing the samples from the asteroid was landed . After a preliminary inspection, it was flown to Japan for research.

Hayabusa-2 sample return capsuleafter landing in Australia. Credit: JAXA

The treasure and the mission

Hayabusa-2 Spacecraft

Hayabusa-2 is an asteroid sample-return mission operated by the Japanese state space agency JAXA. After a series of failures in the first touchdown scientists revised the landing plans and in late 2019, Hayabusa2 left Ryugu. That year-long journey ended in Dec'6 2020. This asteroid ryugu is almost 300 million kilometers away from the earth. The spacecraft made two touchdowns on the asteroids surface, from where it collected the black grain samples along with other gases in the capsule.

The first look and the preliminary inspection of the samples were made in the Australian lab itself and later sent to the JAXA's research centre in japan. The Scientists working inside a super-clean laboratory, have opened the first of three sample collection chambers inside Hayabusa 2's return capsule, beginning the process of analysing the material in search of fresh insights into the history of the Solar System.

Black materail found inside one of Hayabusa-2's mission collection chambers

JAXA President Hiroshi Yamakawa says "He believes analysis of the samples may help explain the origins of the solar system and how water helped bring life to Earth. Fragments brought back from Ryugu can also tell its collision and thermal history."

After about a year, some of the samples will be shared with NASA and other international scientists. About 40 per cent of them will be stored for fu-

ture research. JAXA mission manager Makoto Yoshikawa said just 0.1 gram of the sample can be enough to conduct the planned research, though he said more would be better

The mission is to study possible ways to prevent big meteorites from colliding with Earth.

Did you know??

To collect samples from deeper part of asteroid Hayabusa 2 fired an impactor into the asteroid in February 2019 to create an artificial crater. This allowed the spacecraft to collect a sample from beneath the surface of the asteroid.

But why an asteroid?

Asteroids orbit the sun but are much smaller than planets. They are among the oldest objects in the solar system and therefore may contain clues about how Earth evolved and how it was covered with water . Scientists say that requires studying samples from such celestial objects.

The samples could help to explain how Earth became covered with water. Scientists think water came on asteroids or similar planetary bodies from the outer regions of the Solar System

Collecting samples from Hayabusa-2 Capsule after successfull landing in autralia

Ryugu is a C-type, or carbon-rich, asteroid, which scientists think contains organic and hydrated minerals preserved from as far back as 4.6 billion years ago. It is squashed sphere, peppered with giant boulders.

The asteroid being explored by the Japanese mission Hayabusa-2 is a "rubble pile" formed when rocks were blasted off a bigger asteroid and came back together again. The discovery means that asteroid Ryugu has a parent body out there somewhere.
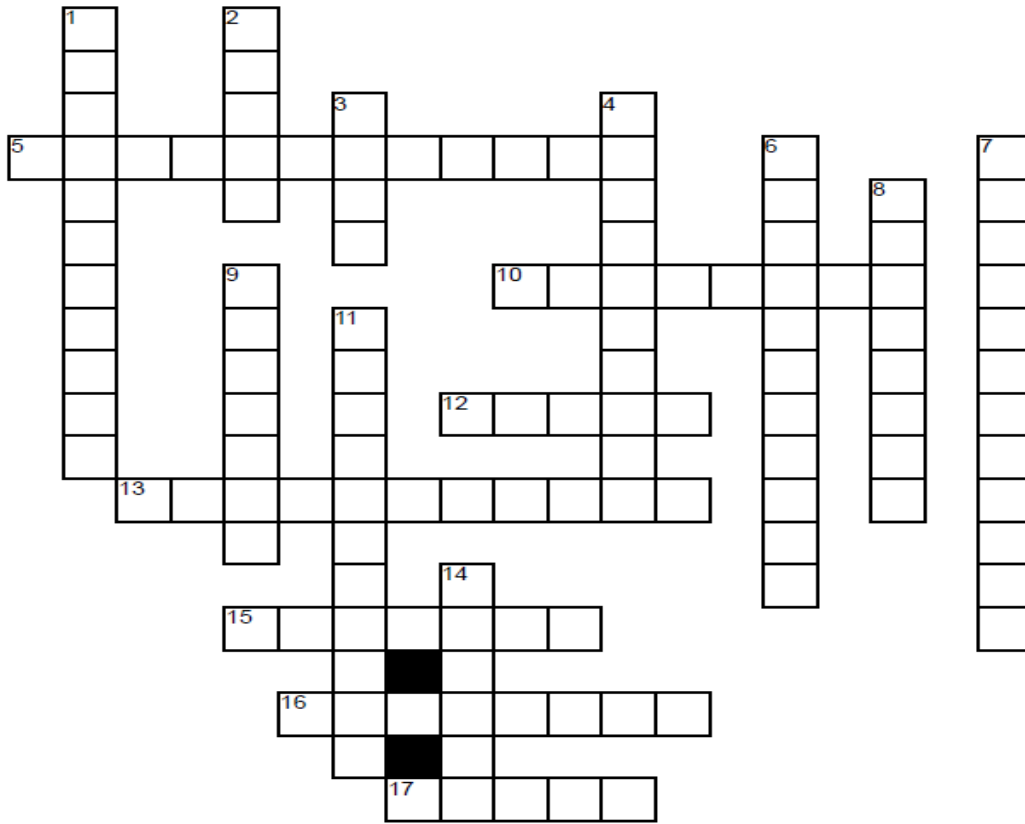
They have also found a chemical signature across the asteroid that can indicate the presence of water, but this needs confirmation.

Scientists from the Japanese Space Agency (Jaxa) mission and from Nasa's Osiris-Rex spacecraft, which is exploring a different asteroid called Bennu, have been presenting their latest findings at the 50th Lunar and Planetary Science Conference (LPSC) in The Woodlands, Texas. Bennu and Ryugu have many similarities. They are comparable in size, rich in carbon and shaped like spinning tops. Both asteroids are primitive objects, made of the same basic material that went into building rocky planets like Earth. Studying samples in laboratories could shed light on how our own world came to be.

Resources:

- *Nature -* https://www.nature.com/articles/d41586-020-03553-1
- *Astonomy Now -* https://astronomynow.com/2020/12/16/scientists-thrilled-with-asteroid-treasure-returned-by-japanese-spacecraft/
- *Youtube -* https://youtu.be/pac5ZZTjIlo

Space Explore Crossword

Across

5. The Great Red Spot is a giant, spinning storm in Jupiter's atmosphere.
10. A large planet of relatively low density consisting predominantly of hydrogen and helium, such as Jupiter, Saturn, Uranus, or Neptune.
12. A celestial object consisting of a nucleus of ice and dust and, when near the sun, a "tail" of gas and dust particles pointing away from the sun.
13. A planet whose orbit lies outside the asteroid belt, i.e., Jupiter, Saturn, Uranus, or Neptune.
15. A celestial body moving in an elliptical orbit around a star.
16. A small body moving in the solar system that would become a meteor if it entered the earth's atmosphere.
17. The curved path of a celestial object or spacecraft around a star, planet, or moon, especially a periodic elliptical revolution.
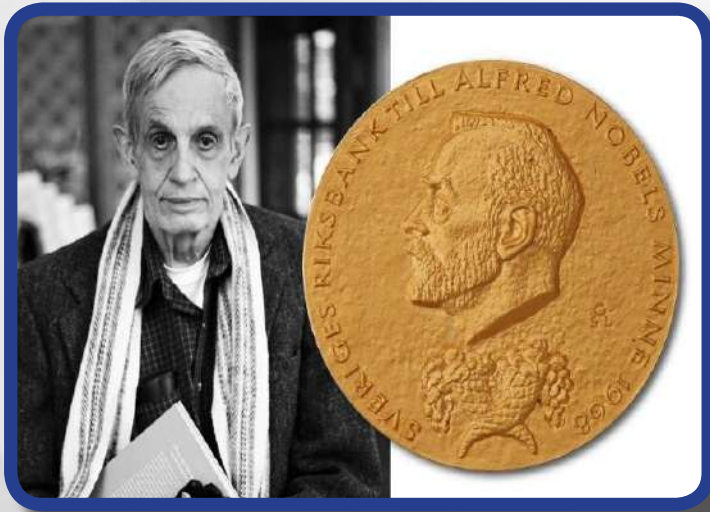
Down

1. A celestial body resembling a small planet but lacking certain technical criteria that are required for it to be classed as such.
2. Is a dwarf planet in the Kuiper belt, a ring of bodies beyond Neptune.
3. The time taken by a planet to make one revolution around the sun.
4. The envelope of gases surrounding the earth or another planet.
6. The collection of eight planets and their moons in orbit around the sun, together with smaller bodies in the form of asteroids, meteoroids, and comets.
7. Planet is a planet that is composed primarily of silicate rocks or metals.
8. A small rocky body orbiting the sun.
9. The force that attracts a body toward the center of the earth, or toward any other physical body having mass.
11. A planet whose orbit lies within the asteroid belt, i.e., Mercury, Venus, Earth, or Mars.
14. Noun: meteor; plural noun: meteors a small body of matter from outer space that enters the earth's atmosphere, becoming incandescent as a result of friction and appearing as a streak of light.

John F. Nash Jr.
The mathematician with A Beautiful Mind

Article by,
Pavitra Venkatraman, 4 Feb 2021

and are interrogating them in separate rooms. Each can either confess, thereby implicating the other, or keep silent. No matter what the other suspect does, each can improve his own position by confessing. If the other confesses, then one had better do the same to avoid the especially harsh sentence that awaits a recalcitrant holdout. If the other keeps silent, then one can obtain the favorable

Who is John F. Nash Jr.

John F. Nash Jr., was an American mathematician who won the 1994 Nobel Prize in Economics, along with John Harsanyi and Reinhard Selten, for his development of the mathematical foundations of game theory. Nash was also a pioneer in the study of differential geometry and partial differential equations. He also developed an equilibrium theory known as the Nash Equilibrium (of which the prisoner's dilemma is a well-known example).

Prisoner's Dilemma:

The prisoners' dilemma is the best-known game of strategy in social science. It helps us understand what governs the balance between cooperation and competition in business, in politics, and in social settings.

In the traditional version of the game, the police have arrested two suspects

Prisoner B

	Remain silent	Confess
Prisoner A — Remain silent	A gets 2 years / B gets 2 years	A gets 8 years / B gets 1 year
Prisoner A — Confess	A gets 1 year / B gets 8 years	A gets 5 years / B gets 5 years

treatment accorded a state's witness by confessing. Thus, confession is the dominant strategy for each. But when both confess, the outcome is worse for both than when both keep silent. The concept of the prisoners' dilemma was developed by RAND Corporation scientists Merrill Flood and Melvin Dresher and was formalized by Albert W. Tucker, a Princeton mathematician.

BREAKING DOWN John F. Nash Jr.

John F. Nash Jr., was born in Bluefield, West Virginia, in 1928. He trained not as an economist but as a mathematician, earning his Ph.D. in mathematics from Princeton at the age of 22. He taught math at the Massachusetts Institute of Technology and worked for the RAND Corporation, but his schizophrenia negatively affected his career for more than two decades.

By the early 1970s, Nash received treatment that allowed his condition to

improve to the point that he was able to begin teaching again at Princeton. It was there that he served as senior research mathematician for the last 20 years of his life. There, he later became known as the "Phantom of Fine Hall" for his habit of filling blackboards with complex equations during the night when no one else was around.

Awards

In 2001 Nash gained worldwide recognition thanks to the Academy Award-winning film "A Beautiful Mind," which chronicles the lives of him and his wife, Alicia, as they struggled between his genius and his mental illness. It was based on the 1998 biography by Sylvia Nasar.
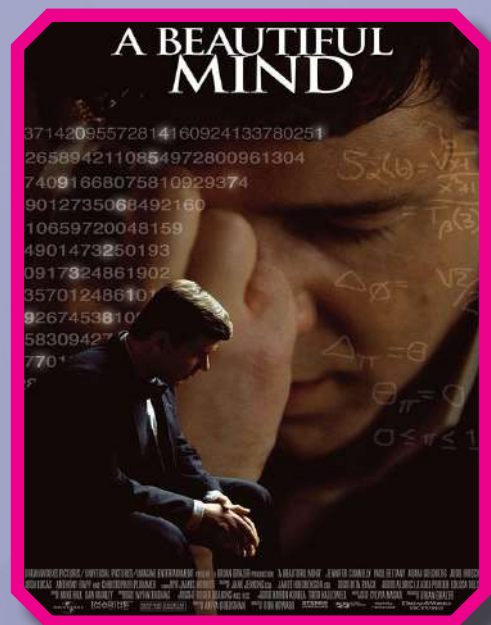
In 2015, John and Alicia Nash were killed when the taxi they were riding in crashed in New Jersey. He was 86 and she was 82. They had been re-turning from Norway, where Nash had been awarded the prestigious 2015 Abel Prize from the Norwegian Academy of Science and Letters.

John F. Nash Jr., Other Work and Legacy:

Among Nash's other groundbreaking math theories: the Nash-Moser inverse function theorem, the Nash–De Giorgi theorem, the Nash embedding theorems, which the Norwegian Academy of Science and Letters said were "among the most original results in geometric analysis of the twentieth century".

His Conclusion:

Twenty years earlier, upon accepting the Nobel Prize for Mathematics, Nash offered a speech that looked back on his tumultuous but accomplished life and concluded:

"Statistically, it would seem improbable that any mathematician or scientist, at the age of 66, would be able through continued research efforts, to add much to his or her previous achievements. However I am still making the effort and it is conceivable that with the gap period of about 25 years of partially deluded thinking providing a sort of vacation my situation may be atypical. Thus I have hopes of being able to achieve something of value through my current studies or with any new ideas that come in the future."

Resources:
- ***His Contributions -*** https://medium.com/cantors-paradise/the-beautiful-life-of-john-forbes-nash-jr-8931a4781ce5
- ***Nobel Prize -*** https://www.nobelprize.org/prizes/economic-sciences/1994/nash/facts/

Light Show Or Fireworks
The New Classic, A Modern take on the Traditional style

Article by,
Saarabi Parkar, 2 Feb 2021

DRONES

An unmanned aerial vehicle (UAV) commonly known as a drone is an aircraft without a human pilot on board. Drones have many applications, among them the most recent use is the drone light show

WHAT IS A DRONE LIGHT SHOW, EXACTLY?

Drone light shows are performed by illuminated, synchronized, and choreographed groups of drones that arrange themselves into various aerial formations. Almost any image can be recreated in the sky by a computer program that turns graphics into flight commands and communicates them to the drones.

When you think about it, fireworks actually have quite a limited repertoire. Usually, a handful of effects are repeated over and over again, just in varying combinations, sizes, colors and intensities. Why settle for this when you can have dynamic, repositionable 3D pixels capable of generating virtually unlimited imagery?

Drones offer far more creative options than fireworks. In fact, it's easy to envision that as drone shows become more commonplace, people will one day look back on fireworks displays as being quite mundane in comparison.

DID YOU KNOW?

Verge Aero flies a stethoscope for frontline workers at the Hospital of the University of Pennsylvania 1,374 illuminated dancing drones have achieved the Guinness World Record for the most unmanned aerial vehicles in simultaneous flight.

Regardless, the transition from fireworks to drones will happen gradually. As drone shows become more affordable, we can expect to see events using them more frequently.

WHY HAVEN'T I SEEN MORE SHOWS?

The problem is that successful show execution requires different technologies. Innovations usually take time to disseminate, and drone shows are no different. A number of factors have limited the uptake of drone shows before now:

▶ High cost

▶ Need for regulatory approval

▶ Expensive and limited insurance options

▶ Labor intensive operations

▶ Lack of efficient show design tools

▶ Safety requirements

The use of specialized drones with high-precision avionics drives high cost. Labor intensive operations also contribute, whether it's wrangling rudimentary control software or preparing finicky drones for flight.

High operating expenses are possibly acceptable for the Super Bowl or the Olympics, but are not viable for most events

Resources:
- *Forbes - Drone Light Shows "Way Cooler" Than Fireworks.*
- *Wikipedia - Drone display*

Cyber Security and Cyber Crime
The Basics, Detection and Prevention

Article by,
Atharva Deshpande, 4 Feb 2021

Definition:

The state of being protected against the criminal or unauthorized use of electronic data or the measures taken to achieve this.

Common Targets

A. Emails

1. Cybercriminals use a variety of vectors to reach and trick victims.
2. They retrieve personal information such as :
   - Login credentials
   - Money transfer
   - Tracking Phone calls

B. Phishing Attacks

1. Phishing is nothing but data breaching(stealing)
2. Phishing attacks can occur via texts, emails.
3. These attacks track usernames and passwords.

Eg:

ISRAEL hacked into nuclear power systems of IRAN and infected their computers with dangerous computer viruses

C. Media

1. Media is basically involved in cyber warfare although it is not a crime.

2. Cyber warfare is forced propaganda against a particular country or a group of countries to increase fear and pressure.

Method for Cyber Security

1. Keeping a strong password especially in net banking in order to avoid fraudulent transactions.

2. Intrusion prevention systems constantly scan and analyze network traffic/attacks so that cyberattacks can be identified and responded quickly.

3. Antimalware tools are a kind of network security software designed to identify dangerous programs and prevent them from spreading.

4. Data loss prevention:
   • To protect data we need to identify all the places it can reside including shared network drives, databases, cloud storage, email, instant messaging apps, and hard drives.
   • DLP policies should detail rules for archiving data such as audit trail and information about IT security incidents.

Cloud Computing Security

Cloud computing security refers to a broad set of policies, technologies, applications, and controls to protect virtualized IP. It was first used in 2006.

Types of controls associated with cloud security :

1. Deterrent controls
   • These controls are intended to reduce attacks on a cloud system.
   • These controls give warning for adverse consequences and they are a subset of preventive controls.

2. Preventive controls
   • They strengthen the system against incidents and eliminating vulnerabilities.
   • Unauthorized access in cloud sys-

tems can be prevented with the help of strong authentication of cloud users.

3. Detective controls :
   • These controls monitor system and network security.
   • During an attack the detective controls will signal the corrective controls to address the issue.
   • Cloud users should be positively identified.

4. CORRECTIVE CONTROLS :
   • Corrective controls reduce the consequences of an incident, by limiting the damage.

Note
• *For reporting any kind of cyber crime, tht occurs with you or anyone else, reach out to:*

  cybercrime.gov.in or visit the nearest cyber cell in your city.

• *For more information, the steps to file a complaint and required documents, visit:*

  https://ifflab.org/how-to-file-a-cyber-crime-complaint-in-india/

The biggest "Oh no!"
SolarWinds gets hacked!

Article by,
Pavitra Venkatraman, 4 Feb 2021

SolarWinds, a major US information technology firm, was the subject of a cyberattack that spread to its clients and went undetected for months. SolarWinds is a major IT firm that provides software for entities ranging from Fortune 500 companies to the US government. Foreign hackers, who some top US officials believe are from Russia, were able to use the hack to spy on private companies like the elite cybersecurity firm FireEye, Microsoft, Intel and the upper echelons of the US Government, including the Department of Homeland Security and Treasury Department.
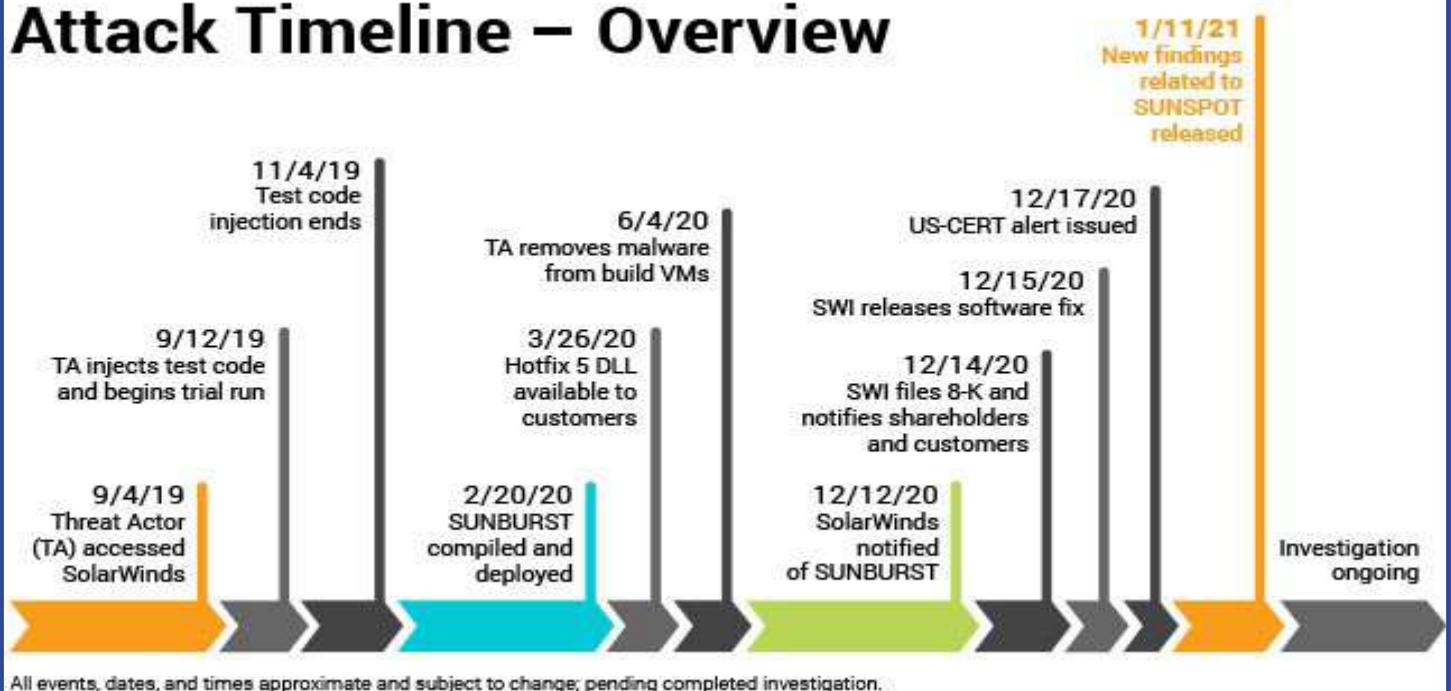
An unusual hack:

Earlier this year, hackers secretly broke into Texas-based SolarWind's systems and added malicious code into the company's software system. The system, called "Orion," is widely used by companies to manage IT resources. Solarwinds has 33,000 customers that use Orion, according to SEC documents.

Most software providers regularly send out updates to their systems, whether it's fixing a bug or adding new features. SolarWinds is no exception. Beginning as early as March, SolarWinds unwittingly sent out software updates to its customers that included the hacked code.

The code created a backdoor to customer's information technology systems, which hackers then used to install even more malware that helped them spy on companies and organizations.

Attack Timeline – Overview

1/11/21 New findings related to SUNSPOT released

11/4/19 Test code injection ends

6/4/20 TA removes malware from build VMs

12/17/20 US-CERT alert issued

9/12/19 TA injects test code and begins trial run

3/26/20 Hotfix 5 DLL available to customers

12/15/20 SWI releases software fix

12/14/20 SWI files 8-K and notifies shareholders and customers

9/4/19 Threat Actor (TA) accessed SolarWinds

2/20/20 SUNBURST compiled and deployed

12/12/20 SolarWinds notified of SUNBURST

Investigation ongoing

All events, dates, and times approximate and subject to change; pending completed investigation.

The victims:

SolarWinds told the SEC that up to 18,000 of its customers installed updates that left them vulnerable to hackers. Since SolarWinds has many high profile clients, including Fortune 500 companies and multiple agencies in the US government, the breach could be massive.

US agencies, including parts of the Pentagon, the Department of Homeland Security, the State Department, the Department of Energy, the National Nuclear Security Administration, and the
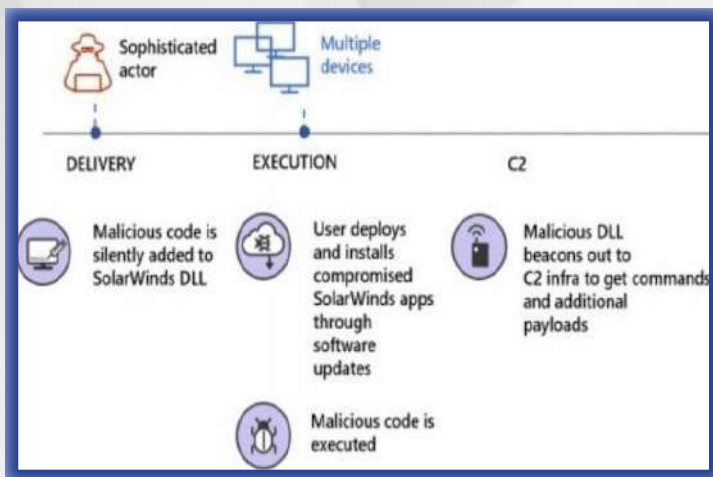
Treasury were attacked. So were private companies, like Microsoft, Cisco, Intel, and Deloitte, and other organizations like the California Department of State Hospitals, and Kent State University. And since the hack was done so stealthily, and went undetected for months, security experts say that some victims may never know if they were hacked or not

Who did it?

Federal investigators and cybersecurity experts say that Russia's Foreign Intelligence Service, known as the SVR, is probably responsible for the attack. Russian intelligence was also credited with breaking into the email servers in the White House, the State Department, and the Joint Chiefs of Staff in 2014 and 2015.

Russia has denied any involvement with the breach and President Trump has suggested, without evidence, that Chinese hackers may be the culprits.

Why it matters:

Now that multiple networks have been penetrated, it's expensive and very difficult to secure systems. With access to government networks, hackers could, destroy or alter data, and impersonate legitimate people.

Not only is the breach one of the largest in recent memory, but it also comes as a wake-up call for federal cybersecurity efforts. The US Cyber Command, which receives billions of dollars in funding and is tasked with protecting American networks, was "blindsided" by the attack. Instead, a private cybersecurity firm called FireEye was the first to notice the breach when it noticed that its own systems were hacked.

Finally, the hack could accelerate broad changes in the cybersecurity industry.

And the US government may reorganize its cybersecurity efforts by making the Cyber Command independent from National Security Agency.

Reference:
- *Channele2e - www.channele2e.com*
- *Wikipedia*

Intents Go

Using just your phone for Pothole Detection.

Article by,
Arfah Upade, 4 Feb 2021

Potholes are a major problem in India, with over 2,000 people dead and more than 4,000 succumbed to injuries from accidents caused by potholes, as recorded in the year 2018 Government data, also with some going unrecorded.

In such a scenario, Tabrez Alam, Naresh Kacchi, Prakash Velusamy, and Balasubramaniam R started Intents Mobi Private Ltd. earlier in 2020, based in Gurugram, India, to collect data about potholes and alert users to avoid accidents.

For this, they devised Intents Go, an app that simply captures potholes using your phone's sensors, such as gyroscope and accelerometer, and an algorithm that observes changes in your vehicle's speed and sudden dips and jumps to determine if a road has potholes in certain places.

Intents Go uses HERE map technology to carry out it's functionality and to enhance privacy, stores collected data behind a public key infrastructure (PKI), and doesn't require any personal data.

Intents Go can be simultaneously used with Google maps, in order to alert the driver about potholes and thus is not necessarily used for navigation.

The app works offline as well and also manages data of any removed/repaired potholes for accuracy.
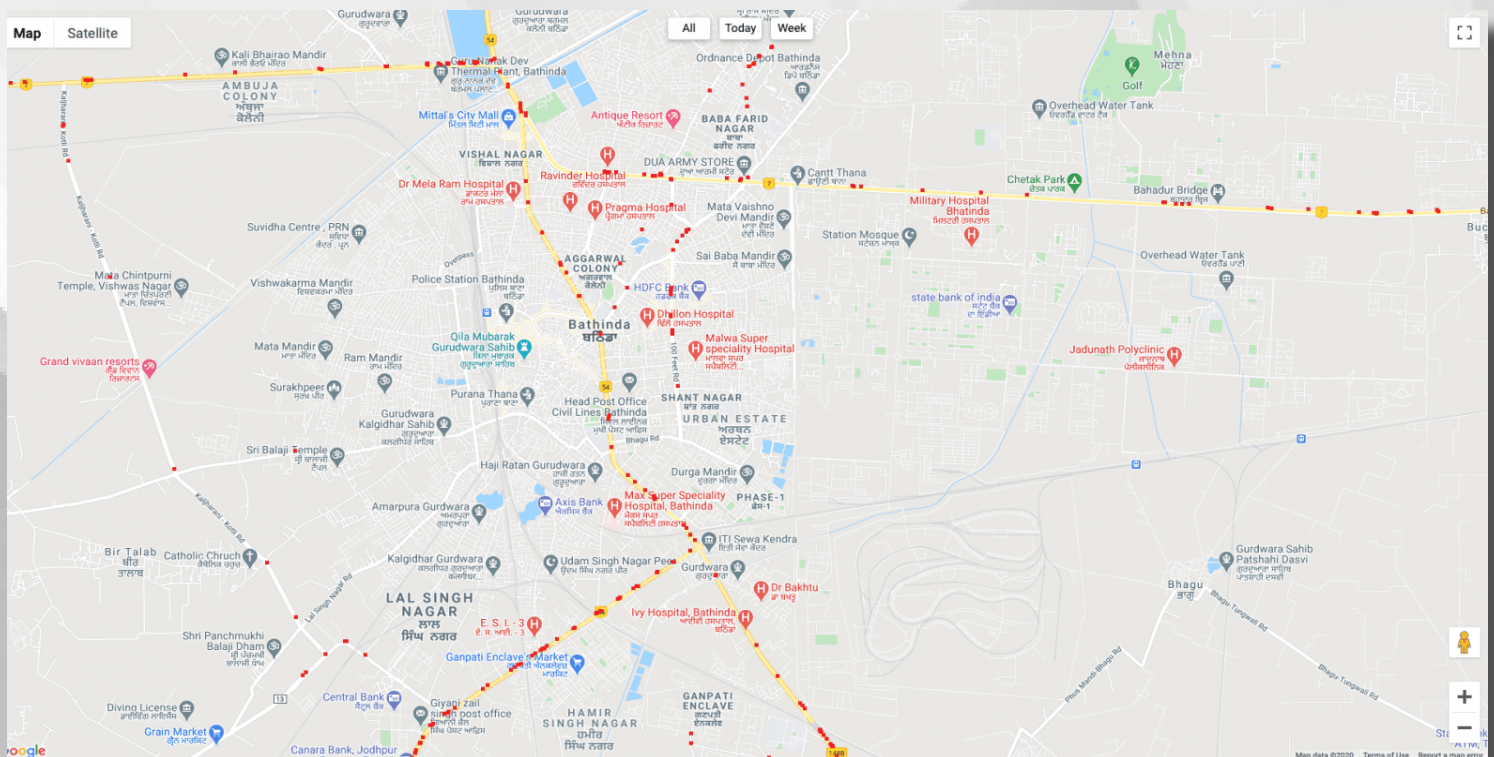
Intents Go map indicating potholes in an area

"To track these potholes, the company needed a lot of data. However, due to the coronavirus pandemic, people were not moving around. So, the company incentivized truck and cab operators to install its driver app in exchange for monetary rewards. Apart from potholes, the company also encouraged drivers to record other points such as police post, waterlogged spots, and closed roads with photo proof."
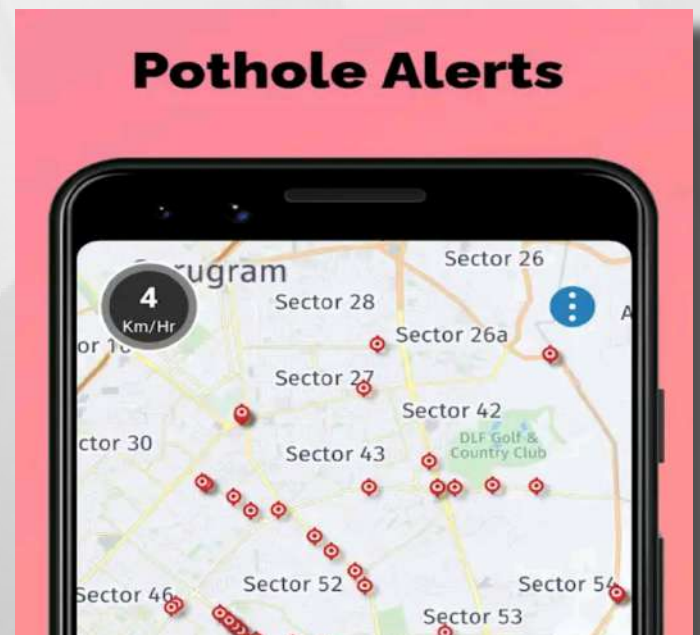
- Ivan Mehta, TNW
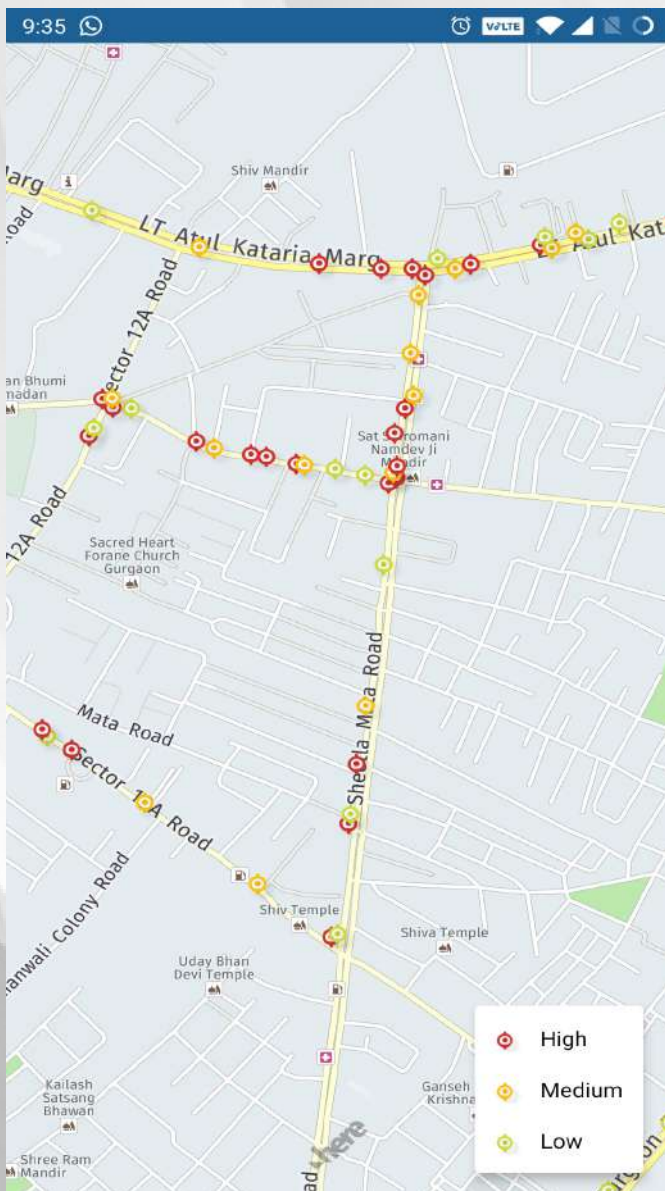
Potholes severity, a work in progress feature

A further enhancement that the company is working on is to train the ML Algorithm to detect the severity of potholes, thereby allocating a coloured marker to it.

Intents Mobi Private Ltd. has identified this app being very useful to construction and logistics firm, for monitoring the road situation, and has approached various Government agencies for creation of dashboards that'll aid authorities in repairing road faults to avoid accidents.

By far, it's done a good job addressing a critical issue and has got more than 120,000 active users mapping more than 750,000 kilometers daily — with more than 150,000 potholes or speed breakers being recorded.

Reference:
- *Source: How this startup is mapping India's potholes using just your phone - Ivan Mehta*
- *Website: https://intents.mobi/*

Counting Elephants from Space!
AI to detect endangered elephants

Article by,
S. Ananthaselvi, 29 Jan 2021

Scientists have exposed a new tool for monitoring endangered wildlife: an AI system that automatically counts elephants from space. This new innovation combines satellite cameras with a convolutional neural network (CNN) to detect African elephants moving through forests and grasslands.

The test results were as accurate as detected by human observers. Therefore, this project joins hands with other AI projects that help to protect these endangered animals

This system is very efficient as it automatically counts the animals from low-flying airplanes. Each satellite camera can capture 5000 km^2 of imagery every few minutes.In addition to this, this system can even track animals as they freely roam around the forests and grasslands.

The researchers trained and tested their model on endangered African elephants in South Africa, using data from the WorldView-3 and WorldView-4 satellites (the highest resolution satellite imagery that's commercially available).

> *Accurate monitoring is essential if we're to save the species. We need to know where the animals are and how many there are said Dr Olga Isupova, a computer scientist at the University of Bath who created the detection algorithm.*

In order to test whether it works outside the study area, the researchers also applied the model to lower resolution satellite images that have been captured in Kenya.

For testing this system, African elephants have been chosen as it is one of the largest animals in the world which would help them to spot the elephants easily. The researchers also added that they believe their system could soon detect smaller species as well.

"Satellite imagery resolution increases every couple of years, and with every increase, we will be able to see smaller things in greater detail," said Dr Isupova."
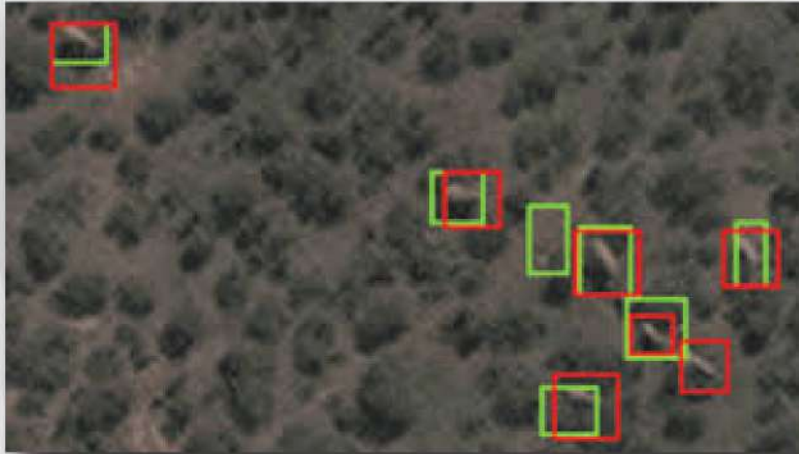
Ai Used to Spot Elephants in forest

Super Computers Of India

Two supercomputers from India in TOP-500 list.

Two supercomputers from India — PARAM Siddhi-AI and Mihir — have made it to the TOP500 list of the world's most powerful supercomputers. The two systems have been ranked 63rd and 146th, respectively, and remain the only two supercomputers from India in the latest list of TOP500 released on November 18 2020.

PARAM Siddhi-AI

PARAM Siddhi-AI has an Rpeak capacity of 5.267 Petaflops and Rmax capacity of 4.6 Petaflops. It was led and built on NVIDIA DGX SuperPOD architecture. The system, jointly built by the Department of Science and Technology and Ministry of Electronics and IT under the National Supercomputing Mission, was conceptualised by Pune-headquartered Centre for Development of Advanced Computing.

PARAM Siddhi-AI

MIHIR

'Mihir' is a 2.8 Petaflop supercomputer which has been operational at the National Centre for Medium Range Weather Forecast (NCMRWF), Noida. It is one of the powerful systems owned by the Ministry of Earth Sciences and has helped improve India's forecasting skills.


Mihir

VIRTUAL REALITY

In brief and where it stands now.

Article by,
Atharva Deshpande, 29 Jan 2021

Over the past two decades, there have been big strides in the technological development of VR products. In the early 90's, a number of headsets were released which allowed the user to view a video on it from an external device.

Another example would be Google Class Explorer. This captured the imagination of many people, and it was one of the first "Augmented Reality" products available to consumers.

Virtual reality is a simulated experience that can be similar to or completely different from the real world.
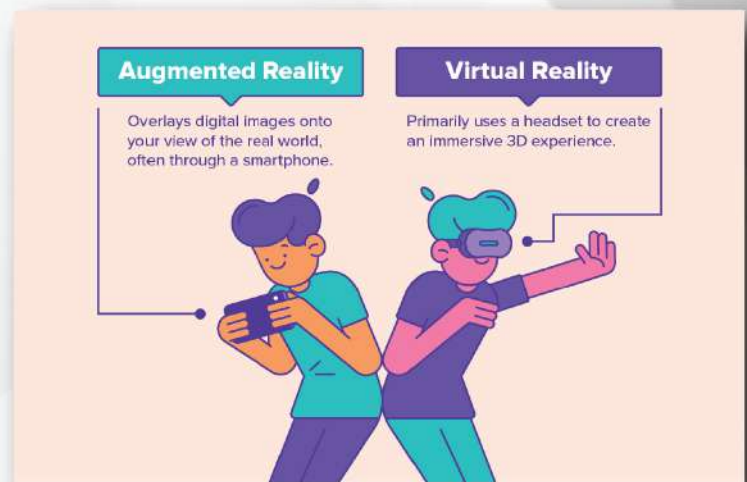
What Are the Key Technologies?

A headset is made up of many component parts, including optics, displays, sensors and haptics. The component parts must fit together. Within optics, waveguides are an important part of augmented and mixed reality displays, transmitting the image from the display to the user's eye. There are many different requirements which must be fulfilled, and although currently there are optical artifacts present in some headsets, it is likely in the future that these will be removed as technology evolves.

Future of VR:

• Virtual Reality is one of the technologies with the highest projected potential for growth. According to the latest forecasts from IDC Research (2018), investment in VR and AR will multiply 21-fold over the next four years, reaching 15.5 billion euros by 2022.

• Nowadays, the market is demanding applications that go beyond leisure, tourism or marketing and are more affordable for users. Virtual interfaces also need to be improved to avoid defects such as clipping, which makes certain solid objects appear as though they can be passed through.

• The latest 5G standard can also provide very interesting scenarios for the evolution of VR. This standard will allow more devices and large user communities to be connected.

Applications of VR:

• Immersive journalism takes the user to the places where events have occurred with live streaming of 360° videos.
 • The Spanish National Research Council has succeeded in reducing the effects of Parkinson's in several patients by applying a treatment that uses VR.
 • In classrooms, the use of VR allows students to better retain knowledge and helps students with learning difficulties.

Did you know?

- *The global AR and VR market is expected to grow to $209.2 billion by 2022*
- *171 million people use VR technology today.*

References:

To better understand virtual reality we can further refer to the following websites.
- *https://www.wired.com/story/wired-guide-to-virtual-reality/*
- *https://www.iberdrola.com/innovation/virtual-reality*

The Sixth Sense Technology

The entire world as screen

Article by,
Saarabi Parkar, 4 Feb 2021

What Is Sixth Sense?

Sixth Sense is a wearable gesture interface that augments the physical world with the digital world around us, it comprises hardware components connected wirelessly to the computing device, it uses enabling surfaces, walls and physical object as interface. Sixth sense frees the information from the confined surface. Thus reducing the gap between the physical and digital world.

Why to choose sixth sense technology?

Humans take decisions after acquiring inputs from the senses. The information which could help making a good decision is largely available on the internet. Although the information can be gathered by connecting devices like computers and mobiles, they are restricted to the screen and there is no direct interaction between the tangible physical world and intangible digital world. This sixth sense technology provides us with the freedom of interacting with the digital world with hand gestures. This technology has a wide application in the field of artificial intelligence. This methodology can aid in synthesis of bots that will be able to interact with humans.

Evolution of sixth sense technology

There is no working model of sixth sense but Pranav Mistry, an Indian research assistant in MIT Media Lab, came up with exciting new applications from this technology. Sixth sense technology was developed at media labs in MIT and coined as Wear Ur World (WUW).the physical and digital world.
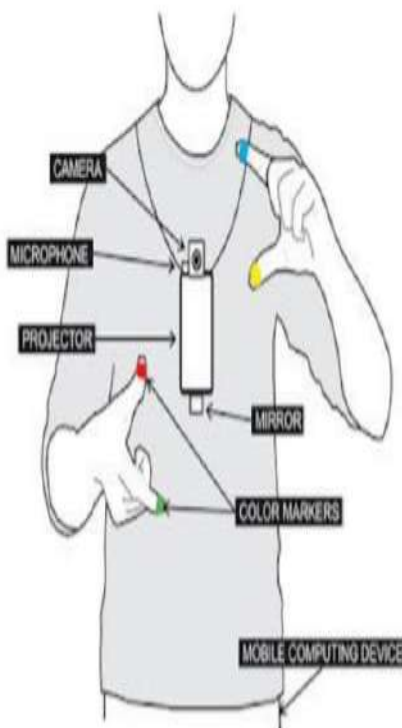
Intresting Fact

Steve Mann is considered as the father of Sixth Sense technology who made a wearable computer in 1990.

Wear Your World (WuW):

Pranav Mistry came up with a prototype consisting of a computing device, camera, projector, color markers, microphone and a mirror. Using wired or wireless connection, projector and camera, both are connected to a computing device which uses the internet via 3G, 4G or wireless Wi-Fi. The whole system then is made wearable using some sort of string, in a way that the projector's end is tilted downward to the

Components of WuW

ground. The mirror is then attached to the front of a projector. The mirror reflects the projection of a visual information to any surface. The cost of the total system is less than $350. Since the device is wearable and we can interact with the real world it was given a name Wear Your World (WUW). Gesture recognition is used to understand

the gestures by webcam; computer vision algorithms are used to identify the objects through the camera. Nowadays WUW is widely called as "SixthSense". Mistry has published the beta software version of this device written in C++ and C# in the Google Code project and he also has given the name of the project WUW.

By using a camera and a tiny projector mounted in a pendant-like wearable device, 'SixthSense' sees what users see and visually augments any surfaces or objects users are interacting with. It projects information

Intresting Fact

WUW prototype also won an Invention Award in 2009 from Popular Science.

onto surfaces, walls, and physical objects around them, and lets them interact with the projected information through natural hand gestures, arm movements, or their interaction with the object itself. 'SixthSense' attempts to free information from its confines by seamlessly integrating it with reality, and thus making the entire world their computer.

WHAT CAN YOU DO WITH SIXTH SENSE?

- *Sixth sense can make your fingers to work as a brush*
- *Capture photos with fingers*
- *Palm is the new dialer*

The Working mechanism of WUW

The camera streams the video and the gestures made by the user's hand. The user's fingers' tips are covered with different distinct colors which helps the camera to recognize the gesture. The camera has a sensor to understand the gesture. These streaming images of objects and gestures are taken as instructions by the computing device. After which the device works as the instruction and also performs a query to the internet if needed and passes the information back. That information is projected out through the projector and mirror reflects it to the desired surface or object. The user can then interact with the projected image to give another instruction. It works very similar like a touch screen phone with the entire world as the screen.

Expected visualization of WuW

Future of Sixth Sense

• *Sixth sense with holographic visualizes the better world.*
• *True 3D print media.*
• *3D visualization and gesture tracking.*
• *Camera can act as an eye for blind people as a fifth sense for them.*
• *Useful for people who can't speak, which will help others to understand by recognizing their sign movements and converting them to text.*

Did you know?

Pranav and his team have open-sourced the code for anyone to use and contribute

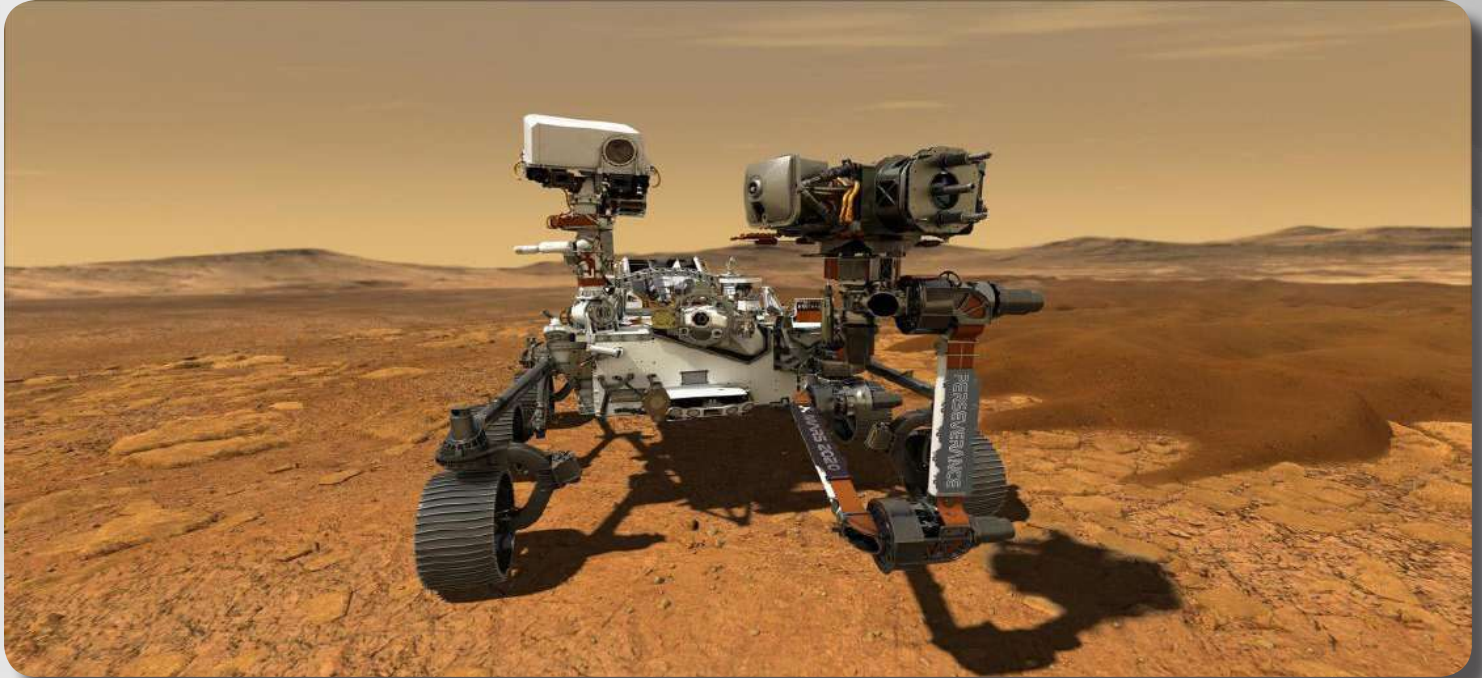*References:*
• *Sixth Sense Technology -By Engineers Garage*
• *Wikepedia Sixth Sense Technology*

Can Percy capture the Red Rusty Planet?
NASA's 5th Rover to Mars

Article by,
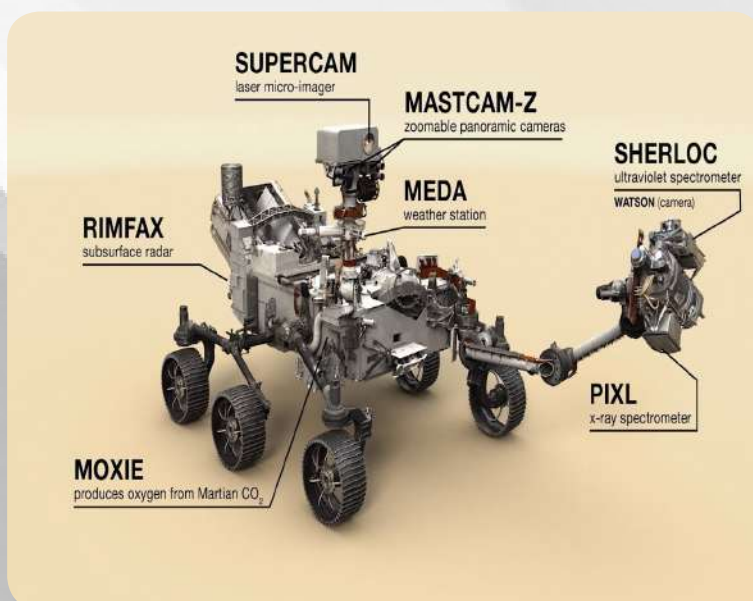*Shubhadarshini Nadar, 4 Feb 2021*

Perseverance Rover

NASA's Perseverance, nicknamed Percy, is an SUV-sized Mars Rover. Percy was launched on 30 July 2020 at 11:50:00 UTC and is scheduled to land on Mars on 18th February 2021, at 20:55:00 UTC, on a place called Jezero Crater. Many astrophysicists think that Jezero Crater, which is located at 18 degrees North and 77 degrees East, is a lake bed in Mars which dried up due to Mars's extreme weather conditions.
   Apart from the Perseverance Rover, there have been 56 missions to Mars to date.

Important Components in Perseverance Rover

What exactly will Perseverance do that the previous 56 missions didn't?

Many of the past missions failed by either crashing into the planet or missing the planet's orbit and getting lost in deep space or just didn't get off from our own planet entirely. This time some upgraded tech will make the landing more accurate than ever. One of the technologies used includes a smart chute containing Terrain Relative Navigation Solution (TRNS) which will act as the eyes of the lander. The parachute will open depending upon

its landing target which will be captured by the TRNS.

In NASA's previous mission (named Curiosity) the chute opened as soon as the craft slowed down to the desired speed. This time, with the help of the TRNS, the Rover will be able to land with much more accuracy, within a range of 30-40 meters.
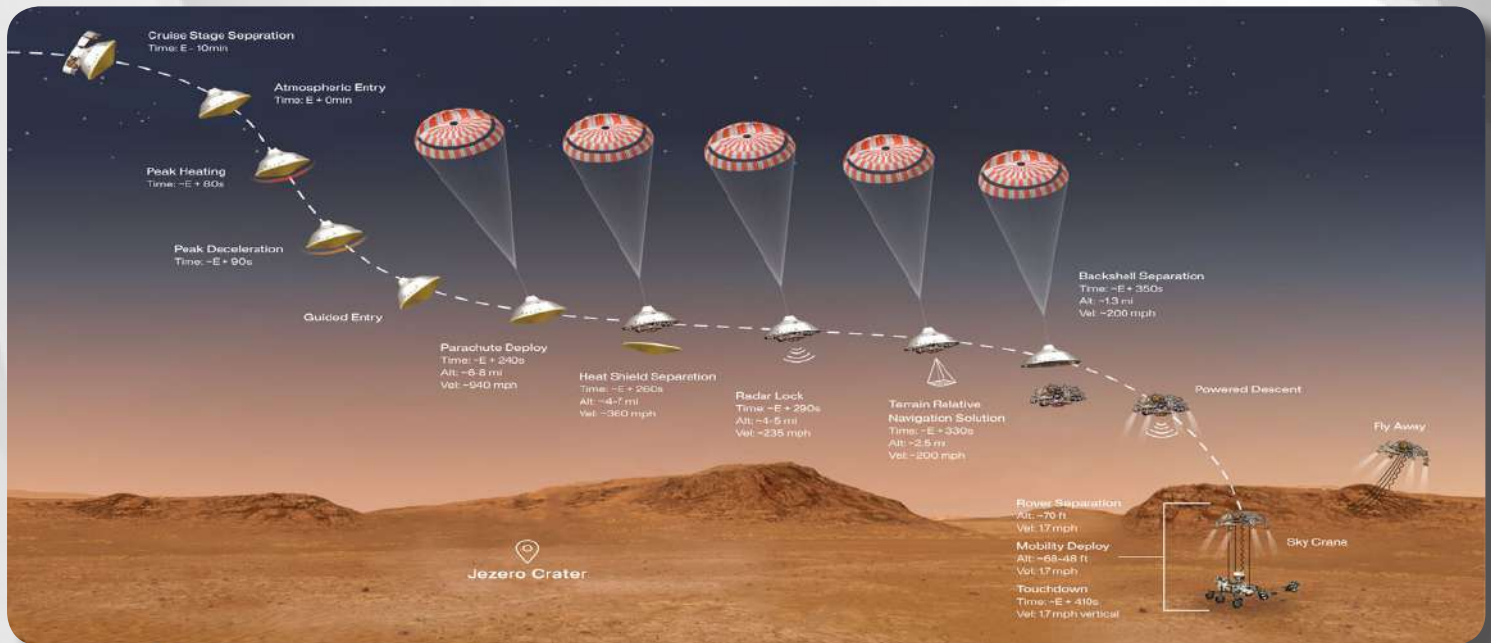
Entry Descent Landing (EDL) Procedure

The main objectives behind Percy are:

- ### To find geological compositions of the landing site:
  Percy is planned to land on Jezero Crater, which is a lake, thus it must have river deltas. Essentially, delta regions have a high build-up of various types of sediments. Most specifically, clay. As on Earth, clay has been found to preserve ancient microbes and if it is the same case on Mars as well, it would be helpful to find ancient life on Mars.

- ### Searching evidence of ancient life:
  Here on Earth, the presence of water results in the existence of lifeforms, no matter the nature or temperature of the water or the height of the region. Therefore, if Mars has evidence of vast amounts of liquid water on its surface, then that's one of the key indicators that life could have potentially formed there. For this, Percy has to find organic matter in various compositions of the sediments.

- ### Prepare for future missions:
  After collecting the samples, Percy will leave them on the surface of Mars. Later in the future, another Rover will be launched to collect all the samples and launch them back to Earth. By the way, till now, nothing has ever launched back to Earth from Mars.

- *Test technology for human exploration:*
  Percy also has a partner on board, named Ingenuity. Ingenuity is a small helicopter more like a drone. If Ingenuity performs well during take-off and has a safe landing on Mars, it can be used for navigating Percy throughout the Jezero Crater. Also, due to Ingenuity, we could get aerial images of the Red Planet. Note that this would be the first powered flight on Mars.

Now how does this lead to human exploration?
  Well, scientists hope to find biosignatures embedded in samples of ancient sediments that Percy is designed to extract from Martian rock for analysis and send back here on Earth. Thus, the Perseverance Rover will give us the information needed to allow the first humans to step on Mars.

5 renown Mars rovers.

1 Sojourner
Mars Pathfinder Mission

Landed on Mars: July 1997
Specialty: Being the first wheeled
                    robot to rove the Red
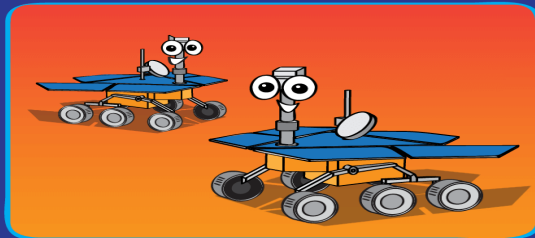   Planet.

Weight: 23 lbs

Top Speed: 0.02 mph

Toolkit: 2 science instruments

2-3 Spirit & Opportunity
Mars Exploration Rovers Mission

Landed on Mars: January 2004
Specialty: Finding evidence of
                    water on Mars.

Weight: 374 lbs (each)

Top Speed: 0.1 mph

Toolkit: 5 science instruments

4 Curiosity
Mars Science Laboratory Mission
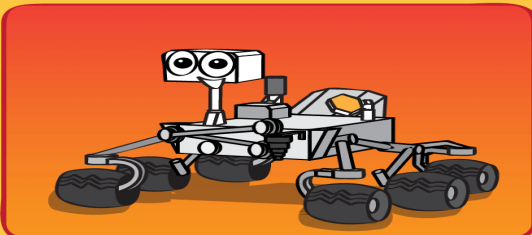
Landed on Mars: August 2012
Specialty: Finding out if Mars
                    once had what all life
                    needs: lasting water
                    and the right chemical
                    ingredients.
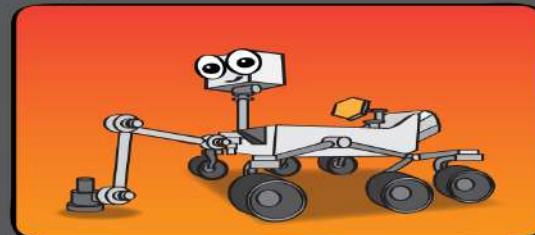
Weight: 1,982 lbs

Top Speed: 0.09 mph

Toolkit: 10 science instruments

5 Perseverance
Mars 2020 Mission

Landed on Mars: February 2021
Specialty: Look for signs of past
                    or present life — and
                    see if humans could
                    one day explore Mars.

Weight: 2,260 lbs

Top Speed: 0.09 mph

Toolkit: 7 science instruments

TechScience WordSearch

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D  B  Q  E  S  U  H  L  P  A  N  N  D  K  X  R  X  L  T  C  W  E  D
W  A  A  T  K  M  Y  H  U  L  V  I  H  G  A  H  P  I  R  K  A  U  B
A  S  D  A  S  G  Q  V  J  J  P  V  J  O  S  Y  C  E  D  N  R  V  Q
U  M  G  G  S  E  I  S  M  I  C  W  A  V  E  S  A  Y  T  X  I  L  Y
M  U  A  Q  H  W  A  R  Q  O  I  Q  I  B  M  T  Q  E  C  B  S  I  F
F  R  N  N  E  C  I  F  K  D  Q  S  R  C  I  H  T  B  E  D  O  T  J
K  W  Z  N  E  D  L  U  R  W  M  V  Q  V  I  M  A  G  I  R  O  H  A
W  Q  J  L  D  H  F  I  L  L  V  F  E  B  D  V  E  B  Y  X  N  O  F
R  W  I  Y  E  S  W  B  P  L  Z  C  F  Y  Q  E  G  P  J  I  L  G  V
G  O  X  D  R  Q  P  E  F  D  O  E  S  J  F  T  F  Y  U  D  U  R  T
S  T  G  V  I  B  T  G  R  D  R  O  V  S  J  J  P  Y  S  R  F  A  O
C  V  V  S  D  G  Y  W  I  O  C  O  I  T  C  I  I  M  L  F  X  P  D
N  T  P  C  L  K  Y  N  V  R  E  H  P  D  X  M  A  U  C  M  P  H  O
H  P  A  S  D  S  G  T  H  F  V  C  B  F  L  M  C  W  D  Z  K  Y  U
L  E  T  S  L  E  E  P  I  N  G  P  A  T  I  E  N  T  S  L  I  E  Z
```

Clues

1. The Japanese supercomputer, _____, produces a simulation that shows how COVID-19 Spreads at a table.

2. Stanford University's Earthquake Transformer uses artificial intelligence (AI) to enhance our ability to read _____ and, in doing so, improve our understanding of how they begin, and even how they come to a stop.

3. A reality-bending app called _____, from developer Cyril Diagne, lets users "drop" real-life objects into a desktop display, in a fun application of augmented reality (AR).

4. The use of applying algorithms using a programming language to create 2D, 3D, or interactive visualizations is termed as _____.

5. _____-inspired robot fingertip morphs to grasp, lift oddly-shaped objects

6. _____ predictive model capable of predicting a hospitalized patient's stability overnight and decide whether they should be left undisturbed from sleep or not, thereby reducing nurse workload up to 20% to 25%, letting them pivot to acutely-ill patients.

7. New Award Winning _____ enables chips 5000 times thinner than a human hair.

8. Flyability's drone called _____ 2 helped researchers inspect one of the most dangerous and inaccessible places in the world — the Chernobyl Nuclear Power Plant, where a core meltdown triggered a major disaster in April of 1986.

8 of 8 words were placed into the puzzle.
Created by Puzzlemaker at DiscoveryEducation.com

Quiz Time Answers

1. 2007   2. Geniuses   3. 2010
4. Siri   5. iPhone   6. 18

Answers:
1. Fugaku   5. Origami
2. Seismic Waves   6. Let Sleeping Patients Lie
3. ClipDrop   7. EUV Lithography
4. Creative Coding   8. Elios