



DESIGN EDITOR
Uma Maheshwar K





LITHIUM SULFUR BATTERY (THE FUTURE BATTERY) -Aditya Bhargav V

Most of us have heard about Lithium - Ion battery i.e. Li - Ion battery, being used popularly everywhere. The mobile we carry employs Li - Ion battery for its power back up. Electric vehicles use this battery as an alternative fuel and the battery is made of Li - Ion.

Then what is the purpose of discussing about LITHIUM - SULFUR battery? The only reason that motivated me to write about LITHIUM - SULFUR battery is with regard to its **ENERGY DENSITY**.

The energy density of Lithium - Sulfur battery is quite high when compared to Li - Ion battery. The problems that we are facing due to Li - Ion battery can be overcome by LITHIUM - SULFUR battery. For example take an instance of your mobile phone, the battery that your phone is employing can supply the power up to 16 - 18 hours typically but if the same battery is replaced by LITHIUM - SULFUR battery, it can supply the power up to 38 hours which is almost double time of Li - Ion battery back up.

Now let's have a look at what constitutes a LITHIUM - SULFUR battery and how does it work. In LITHIUM - SULFUR battery the anode is made of LITHIUM metal and the cathode is made of SULPHUR. First, let us see the various reaction that occurs at anode and cathode, then know about charging and discharging mechanism.

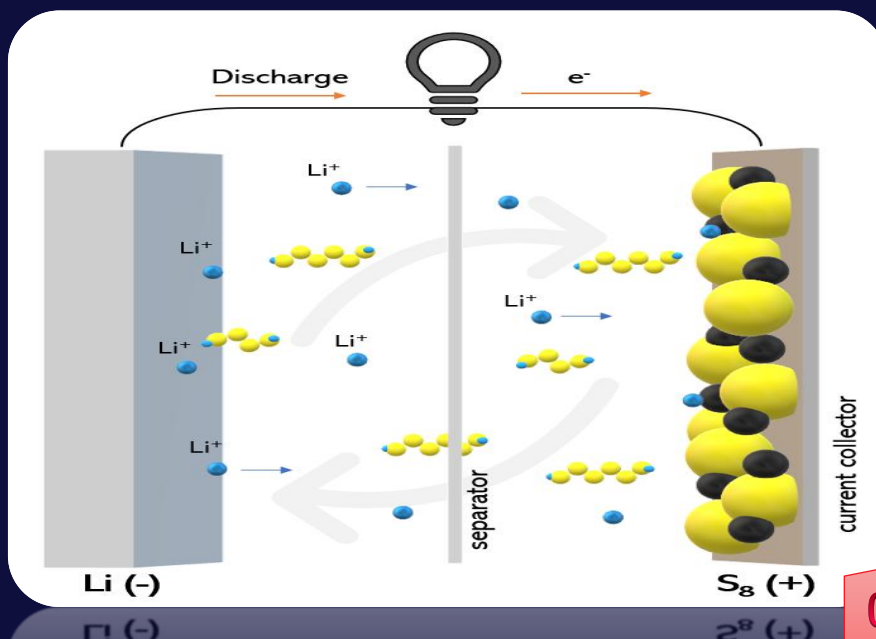
At anode: $\text{Li} \rightarrow \text{Li}^+ + \text{e}^-$

At cathode: $\text{S} + 2\text{Li}^+ + 2\text{e}^- \rightarrow \text{Li}_2\text{S}$

During discharging lithium cells dissolve from anode surface giving rise electrons(e^-) and the reverse process occurs during charging. These have high energy density than Li - Ion battery.....then why these are not being used. The answer to the question is **SHUTTLE EFFECT**. It is mainly responsible for the degrading life of Li - S battery.

Lithium Polysulphate Li_2S_x ($6 < x < 8$) is soluble in electrolyte used in Li - S battery. They are formed and leaked from the cathode and they diffuse to the anode where they are reduced to Short - chain polysulphide and diffuse to the cathode where long-chain polysulfide is formed again. This results in continuous leakage of cathode material leading to low battery life.

Hence, there is wide scope for enhancing the features and technical values of these batteries.





ZING (FLASHING) BAILS – WHY THEY ARE AMAZING! -Rahul B

A bulb glows only when the circuit is connected. But have you ever wondered that how stumps glow when they are bailed out ?

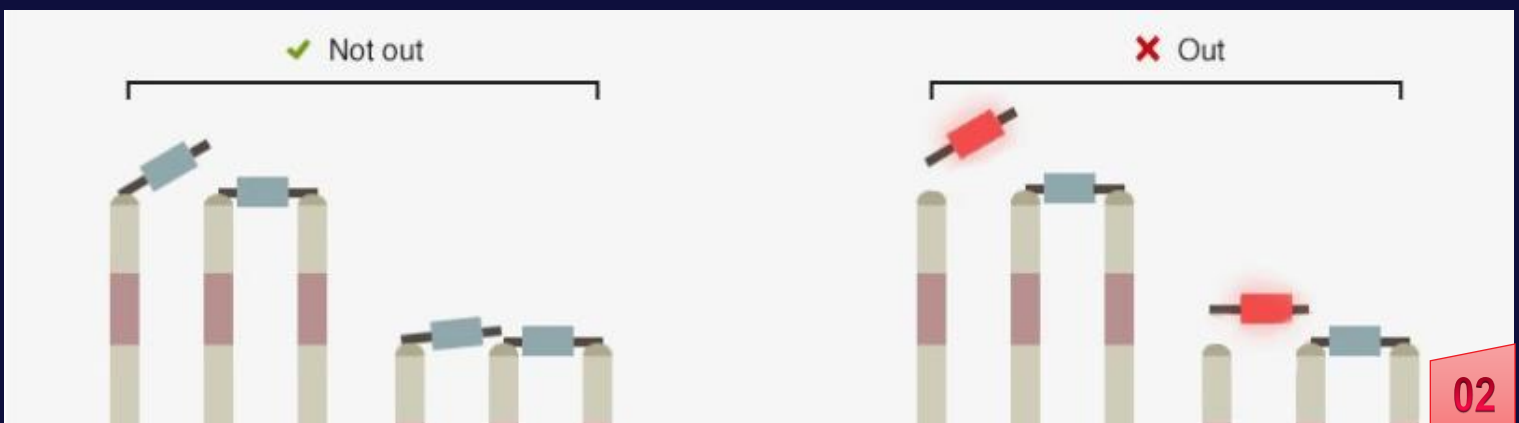
According to cricket rules, a batsman is considered to be out if he is not in the crease while the wickets are bailed out. But as the time went on, the umpires found it difficult to decide whether the batsman is in or out of the crease. Bronte Eckermann, a former Australian cricketer came with a solution.....they are flashing bails.

The principle behind the flashing bails is that the bails of the wickets are powered by low voltage batteries. The each bail contains a microprocessor that detects the breach in the contact between bails and stumps has been broken. The bails are then illuminated in nanoseconds. They can be vibrated, knocked, rained upon, but will only flash when both ends are completely dislodged from the stumps.

This technology has totally changed the traditional decision methodology. This facility has reduced a lot of burden on the umpires and off field umpires during run-out appeals. This type of bails are called as “ZING (Flashing) BAILS”. Since both stumping and run outs are dependent on the bails that have been completely dislodged, two people might have divergent views. The use of zing bails helped in increasing accuracy to a best prospect because the bails glow only when they are completely disconnected from the stump rims. Thereby making it easier for the third umpires and audience alike, while taking decisions.

The mechanism is of highly expensive and the microprocessor used is also capable of emitting out radio waves which also makes the bails glow.

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Know about OPTICAL FIBER CABLES

-Tulasi Krishna G V

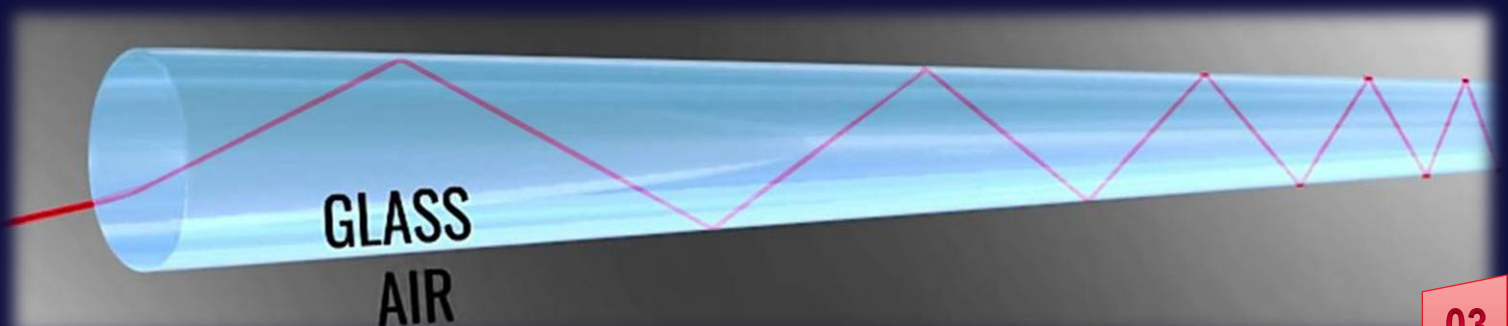
Information is sent to every corner of the world by a network of cables. The most used cable for transmission of data is Optical Fiber Cables. Optical fiber is a thin fiber made up of glass or plastic that can carry light from one end to other end. The group of optical fibers is called Optical Fiber Cable (OFC). These cables can be laid under the ground and below the oceans. These are also used in medical equipment.

Working Principle of OFC

It is well known that, when the light passes through one medium to another medium the bending of light takes place. This phenomenon is called Refraction. Refraction technique is effectively used in Fiber Optics. As the increase in the refractive index of medium the light will be more towards the surface. The increase in angle of incidence of light is more convenient than increasing the refractive index of medium.

At certain conditions/times of incidence angle, the light passes through the surface of glass. This angle is called the Critical Angle. Whenever the light incident ray is increased beyond critical angle, the total internal reflection takes place. The phenomenon of total internal reflection is used in OFC to transmit the data in the form of light. OFC is made up of thousands of fiber strands (threads). The transmission of the data is done through transmission of the light.

A cylindrical glass with high refractive index is used as an inner layer of OFC. When the light passes through this cylinder glass, the total internal reflection takes place. Which in turn makes the light travel to the other end, which means the light is transmitted to other end irrespective of shape and size of the cable. The total internal reflection is only possible between the high refractive index (Glass) and low refractive index (Air).





Parts of OFC

The inner cylindrical glass is called Core. However a protective coating is required in order to stop the propagation of light beyond the outer boundaries of glass. The introduction of protective coating will replace the position of air and seizes the light to pass beyond the boundaries. The primary material used for the protection is called cladding. The refractive index of cladding is less than the refractive index of core. This cladding layer is again protected with silica material. So now the transmission can be done through OFC over a range of hundred kilo meters.

Attenuation

Due to some external factors, there maybe few losses in the propagation of light. These losses are called attenuation. Attenuation is basically caused by the absorption and scattering of light. In order to minimize the attenuation factor, amplifiers are used to boost up the strength of the light which are passing through optical fibers.

Mobile v/s Optic Fiber

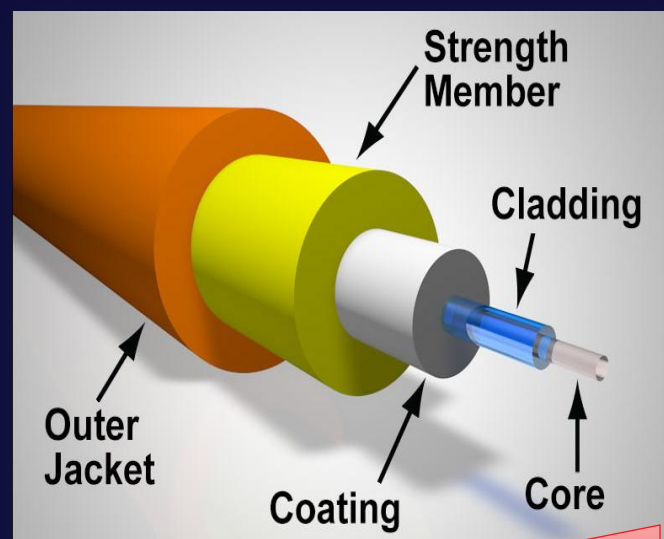
The information can be transmitted through zeros and ones. Assume that you would like to send a text message "Hello" to a mobile. This message is first converted into binary numbers (01001000 01000101 01001100 01001100 01001111). After the conversion the mobile transmits the electromagnetic signals to nearest network tower. The "1" is transmitted as high frequency and "0" is transmitted as low frequency. Whenever the local network station or network tower receives the electromagnetic signals, the pulses are generated. The optical cable carries this pulses in the form of light. The light has to travel through a complicated network of cables across the globe. For this purpose, the entire globe is covered with optic fiber cables, which are laid under the ground or under the ocean.

Advantages

- The speed of light is always greater than the speed of electrons, so the signal is transmitted faster compared with an ordinary metallic cable.
- As there is no external interference of light, the optical fiber is much secure. Therefore lower signal attenuation.
- Optical fiber provides higher bandwidth.
- These cables are flexible and takes less space

Disadvantages

- Skill labour is required for the installation & maintenance.
- OFC allows only uni-directional light propagation.
- OFC cannot transmit electricity.
- The installation cost is high and process is slow to make any sort of network.





STORAGE DEVICE IN A COMPUTER **-Sumanth S**

A Storage Device is a hardware that is capable of storing information either temporarily or permanently.

Types of Storage Devices used in Computer

- Primary Storage, such as RAM
- Secondary Storage, such as Hard Disc... secondary storage can be internal, external or removable.

Examples Of Computer Storage Devices

- Magnetic Storage Devices like Hard Disc, Floppy, Cassette, etc. These are the most commonly used storage devices in a computer.
- Optical storage devices like CD, DVD, etc. These devices use laser light for both reading and writing data.
- Flash memory devices like USB drive, SD card, SSD, etc. have replaced most Magnetic and Optical devices because of their efficiency.
- Online storage like Cloud storage etc., can store data online and we can access the data from more than one device. The data can be retrieved from any place as per requirement using Internet.

Need for Storage in a Computer

Without a storage device, a computer cannot save any settings or information. There is no use of a computer without a storage device. Even a task, such as browsing requires information to be stored on our computer. When saving anything on a computer, it may ask you for a storage location i.e., the area we would like to save the information. By default, most of the information is saved to computer hard disk. To copy information from one computer to another we can use external devices like USB drive, SD card etc.

Accessing a storage device on computer depends on the operating system that we are using. For example, with Microsoft Windows, we can use a file manager or Explorer to access the information in a Storage device, while MAC OS uses finder as its default file manager.

The largest Storage Device available is the Hard Disk or SSD.





FACIAL & VOICE RECOGNITION TECHNOLOGY

-Uma Maheshwar K

In present days security plays a vital role in terms of protecting the data. We have seen many technologies that have been evolved from decades in the field of security .

A technology that is used for identification or verification to allow the user to access the secured information without any need of physical contact with the electronic device is **FACIAL / VOICE RECOGNITION**.

FACIAL RECOGNITION

It works on basic principle of comparing in a way that the system takes the data of subject considering a human face. It takes some facial features like shape of the face and the colour of skin. It compares that data with the source data base available to it. This total process will be carried out with help of an algorithm.

There are many techniques proposed by different tech giant companies and every technique is aimed for high accuracy and high success rate.

Facial recognition has been used by most for surveillance and for identification of people in crowded places (also for identification of criminals in some times).

Not only security but also facial recognition technology is used in different fields to enhance the features.

Many mobile application software have been used as a base to implement their features to attract the users like implementing the animated faces and also for adding filters to human face for fun and entertainment.

But comparatively with the other security techniques like biometric and iris scanner, facial recognition shows less accuracy.

In this evolving era of technology every technique is aimed to reduce the humans physical work and doing task with the help of machine.





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VOICE RECOGNITION

It is one of the rapidly growing technology where a hardware device integrated with a software program performs its task by taking commands from the user. The user commands are translated to its own machine language automatically to accomplish the task. This feature is now available in every smart electronic device available in the market.



Giant companies develop their voice assistants using voice recognition as a base. Day by day the potential, complexity and accuracy of the voice recognition is growing.

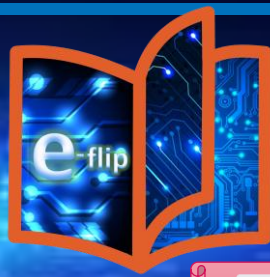
Automatic Speech Recognition (ASR) Software

ASR is used in many fields like healthcare, military and in many industries. In personal computing we use this feature for unlocking a device where one must train their device with their own voice to protect information in terms of security.

Now a days, many companies use this feature to help the users to get them into a right path.

This feature is used in Internet services to search anything with out any physical contact with the device. There are speaker dependent system and speaker independent system. The dependent system requires training of user own voice to take commands. We use this to access our own electronic devices to unlock or to access. Where as speaker independent system doesn't require training of ones own voice it takes commands from everyone. We use this type of system in electric devices which are meant for public services.

Using Artificial Intelligence (AI), the voice assistants are being developed where voice recognition is base wherein a machine interacts with us like an another human.



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Technology for Rescue

SAIF SEAS RESCUE TECHNOLOGY

-Anusha Reddy B

Imagine when you are in cool beach on hot summer day and a person who can't swim is drowning in front of you. How can you save him? Here is the solution by SAIF SEAS.

A rescue on high seas, a lake or any water body - via drone!. Yes you saw it right, it is through drones. If a person is seen drowning the traditional way is like you can send another man (say a life guard) to save him. The technology called SAIF SEAS is used to rescue the drowning person. The best part of this is a drone which will be able to dive through the water. The drone is controlled by a man who is at a certain height from the shore, ensure the drone reaches the man in need of help.

Saif Seas is a water drone defining a new category of safety in the marine race to rescue drowning persons. A standard rescue operation for someone who is drowning doesn't take much time. In case of delay in reaching them in that time frame, the person is lost. SAIF SEAS saves the drowning incidents by racing faster than the lifeguards.

Features of SAIF SEAS

- Unmanned remote controlled
- String 3km communication range for remotes, extendable up to 10 km
- Two hours to get fully charged
- Weighs up to 12kg
- A long-lasting battery with 45 minutes back up on moderate and is enabled with GPS
- Can be fitted with HD camera, robotic probes

www.saifseas.com





ANTENNAS - At a Glance

-Sai Bhatt K

What is an Antenna?

Antenna is a electronic device it converts electrical currents into radio waves. It is specifically used in a radio transmitter (or) radio receiver.

Working of an Antenna

In a transmitter, the radio transmitter applies an oscillating radio frequency through which the electric current passed to the antenna's terminals. It radiates energy that travels by particles (or) waves, particularly electromagnetic radiation such as heat.

An antenna can be used for both transmitting and receiving path.

Transmitting Antenna

Any structure that is efficiently radiate electromagnetic radiation in a specific direction is said to be transmitting antenna. An antenna is to prevent continuation / obstruct / intercept some of the power of an electromagnetic wave in order to produce a small voltages at terminals, which is applied to receiver that is to be amplified.

Receiving Antenna

Any structure that is efficiently receive electromagnetic radiation is said to be receiving antenna. It is good metallic conductor, the system is capable of transmitting and receiving the electromagnetic waves.





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Antenna consists of metallic conductors as elements, electrically connected through a transmission line to the transmitter / receiver. Oscillation is said to be move / swing back and forth. The oscillating current of electrons forced through antenna by transformer. This phenomena creates an oscillation in the form of an magnetic field around the elements of an antenna. The charged electrons move or swing back and forth in the electric field along the antenna elements.

At the same time, the varying field radiates away from antenna into space by moving an electromagnetic field. By oscillating electric field and magnetic field of an incoming radio wave signal, it exerts a force on electrons in the elements of antenna.

By this way creating an oscillating currents in the antenna, it can be used as a transmitter and a receiver. In two way communication, the same antenna can be used as a transmitter / a receiver.

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Team Talk.....

The team **e-flip** conveys their heartfelt thanks to all it's readers / viewers for their overwhelming response. The response has given the extra energy and enthusiasm in team to further proceed.



SAI BHATT K



TULASI KRISHNA G V



ADITYA BHARGAV V



RAHUL B



UMA MAHESHWAR K

Keeping this aspect in view, the team has taken utmost care to enhance the quality of the present issue and presented the articles of technological importance. The articles were presented in lucid manner to disseminate the ideas and views of authors.

e-flip cordially invites the articles related to Science and Technology. Hope the articles presented in **e-flip** certainly to enrich the readers community and budding engineers.

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