VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Technical Paper Presentation on:

LI-FI TECHNOLOGY

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INTRODUCTION

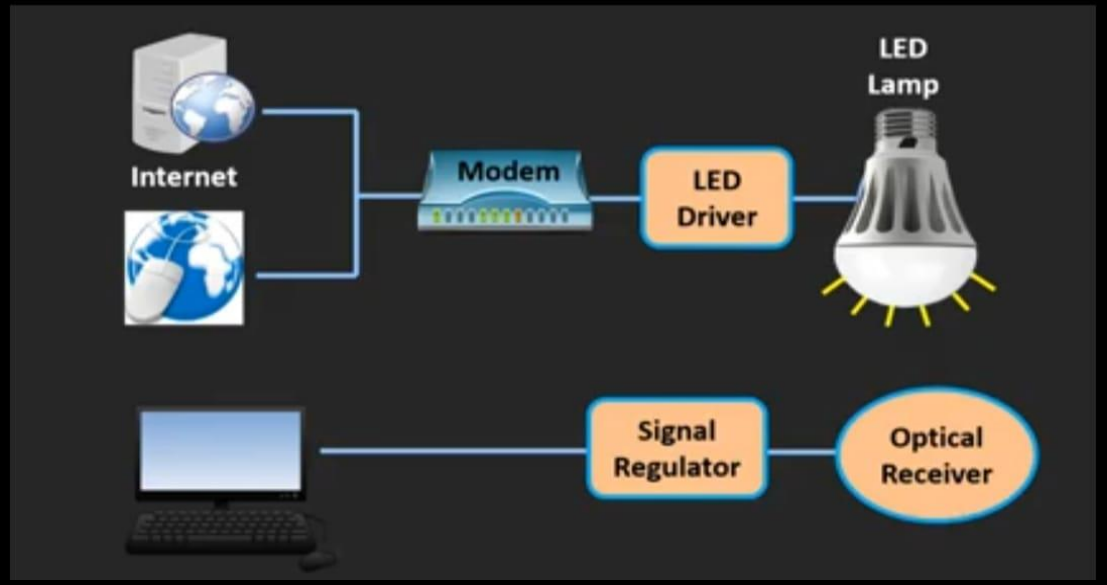
- Li-Fi is used as an abbreviation of the English words Light Fidelity (based on Visible Light Communication).
- The first idea of data transfer with light was Prof. Harald Haas put it forward. Haas is professor of mobile communications at Edinburgh University.
- Li-Fi technology is the same as Wi-Fi in terms of operation, only a small difference.
- In order to transmit data wirelessly, Wi-Fi communication is with radio waves, while Li-Fi uses infrared lights emitted by LEDs to transmit data wirelessly instead of using radio waves.
- However, Li-Fi bulbs are outfitted with a chip that modulates the light imperceptibly for optical data transmission.

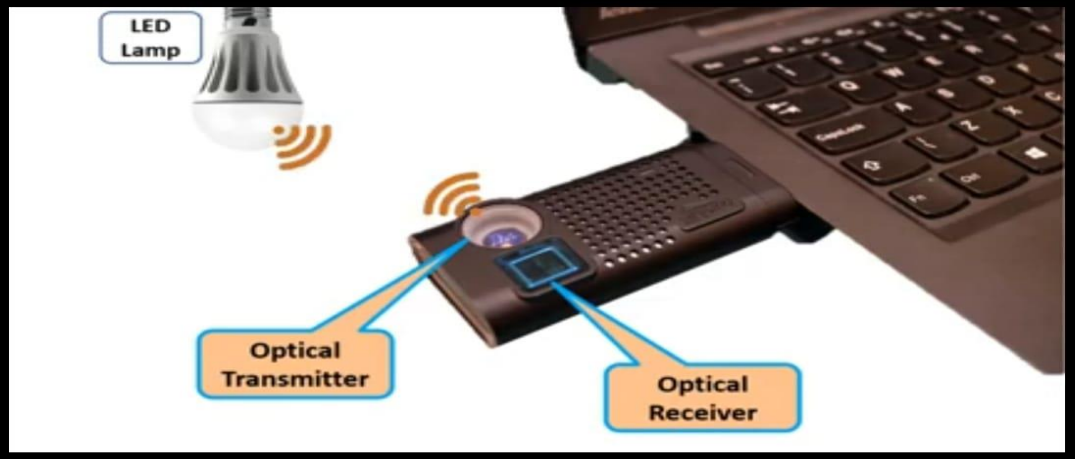
HISTORY

- The technology truly began during the 1990’s in countries like Germany, Korea, and Japan where they discovered LED’s could be retrofitted to send information.
- Professor Harald Haas, from the University of Edinburgh in the UK, is widely recognized as the original founder of Li-Fi
- Prof. Harald Haas promoted this technology in his 2011 TED Global talk and helped start a company to market it.
- In Oct 2011, companies and industry group formed the Li-Fi consortium, to promote high speed optical wireless system.
- He has had the idea for years and has now created a working model of the Li-Fi system.
- In most recent TED talk, he demonstrated one of the Li-Fi prototypes that can transfer video from a solar cell to a laptop via a store-bought LED bulb.

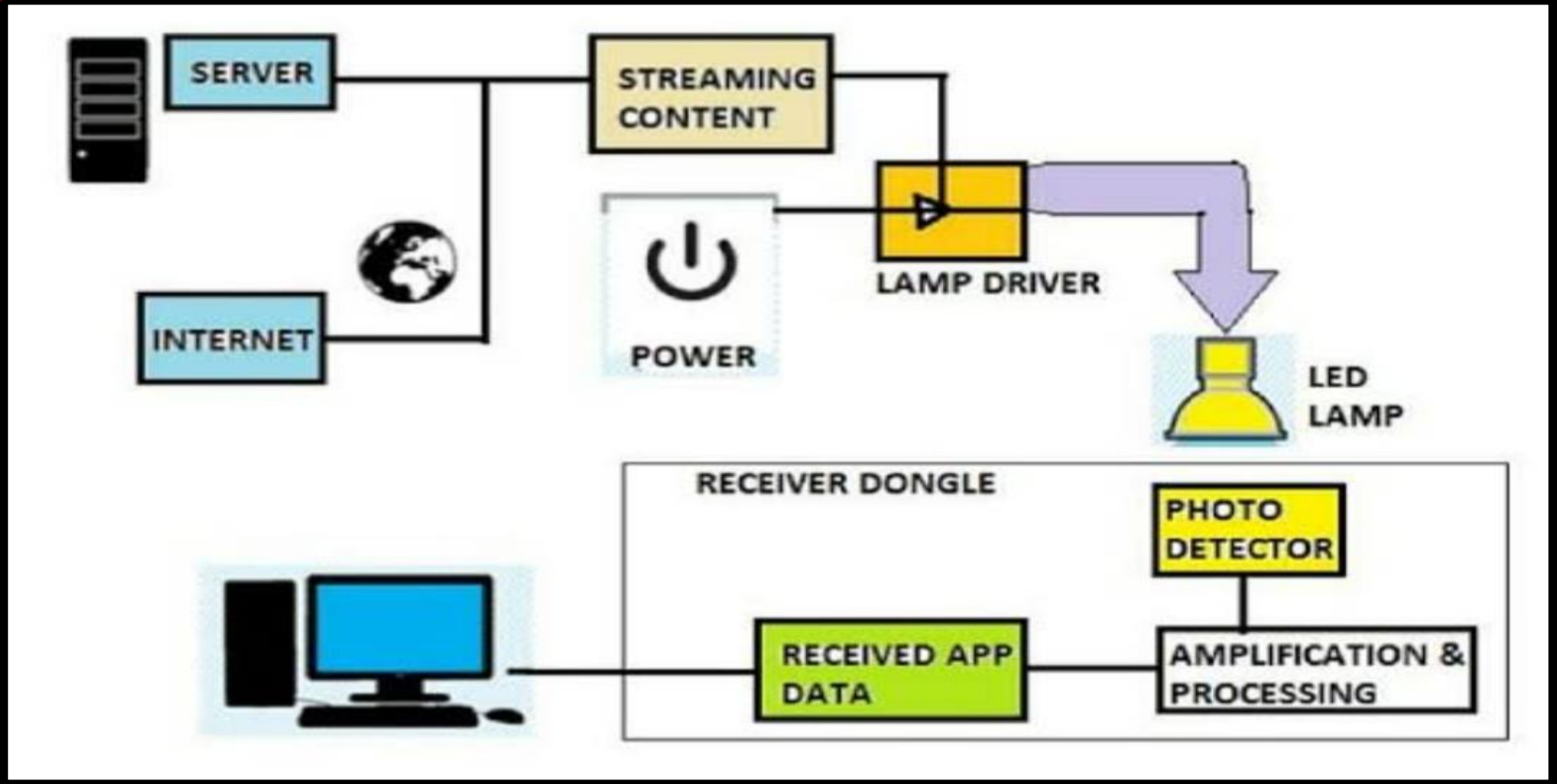
WORKING PROCESS

- If the LED is on, a digital string ‘1’ is transmitted and when the LED is off, then a digital string ‘0’ is transmitted.
- For example, there is a LED at one end and photodetector at another end, whenever the LED is on, a binary ‘1’ and when the LED is off, a binary ‘0’ is registered by the photodetector.
- The on-off activity of the bulb enables data transmission using binary codes.
- Thus every light source will work as a hub for data transmission.



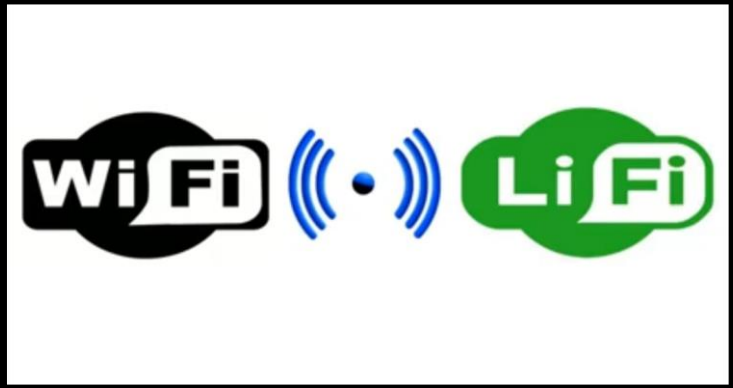


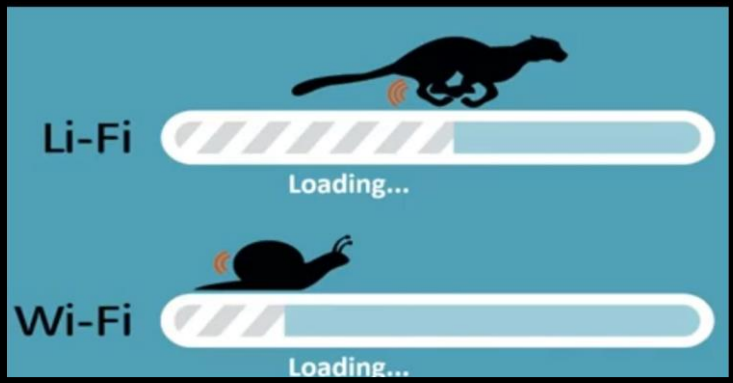
LI-FI ARCHITECTURE



LI-FI VS WI-FI

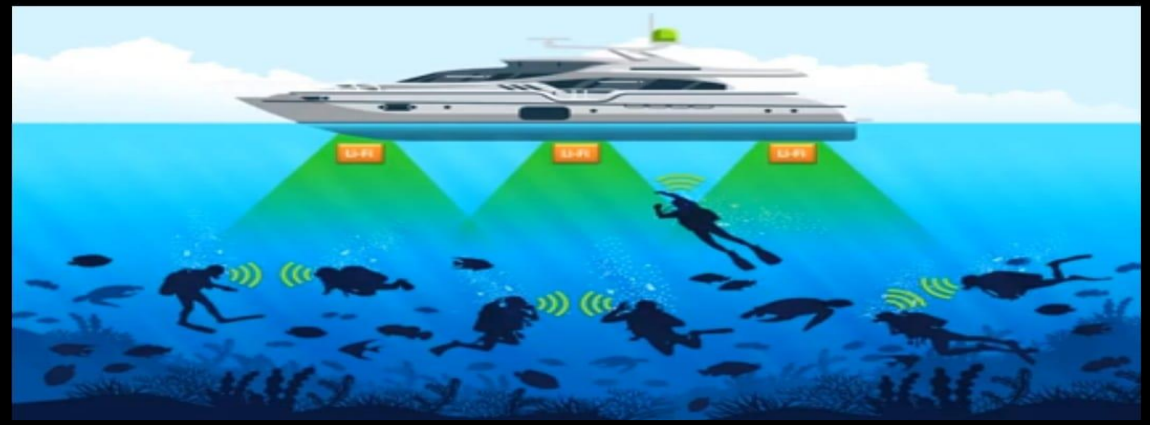
Sl. No.	Parameter	Li-Fi	Wi-Fi
1.	Speed	>1 GB/s	Around 150mb/s
2.	Medium of data transfer	Uses light	Uses radio spectrum
3.	Spectrum range	Visible light has 10000 times more	Having less spectrum range than VLC
4.	Cost	Cheaper	Expensive
5.	Network Topology	Point-to-Point	Point-to-Point
6.	Operating Frequency	Hundreds of Tera Hz	2.4 GHz
7.	Security	High Secure	Medium secure
8.	Power consumption	Low	Medium
9.	Standard	IEEE 802.15	IEEE 802.11
10.	Bandwidth	High due to broad spectrum	Low





APPLICATIONS

- **Hospitals:** Since Li-Fi technology provides very fast data transmission it will be possible to monitor the condition of patients in real time instantaneously.
- In addition, Li-Fi eliminate all health problems that Wi-Fi can cause such as headaches, cancer and more.
- **On ocean Beds:** It can be used for under water communication.
- **Traffic lights:** Vehicles and traffic can communicate with each other.
- Through their frontend real lights and with other systems. Accidents can be avoided.

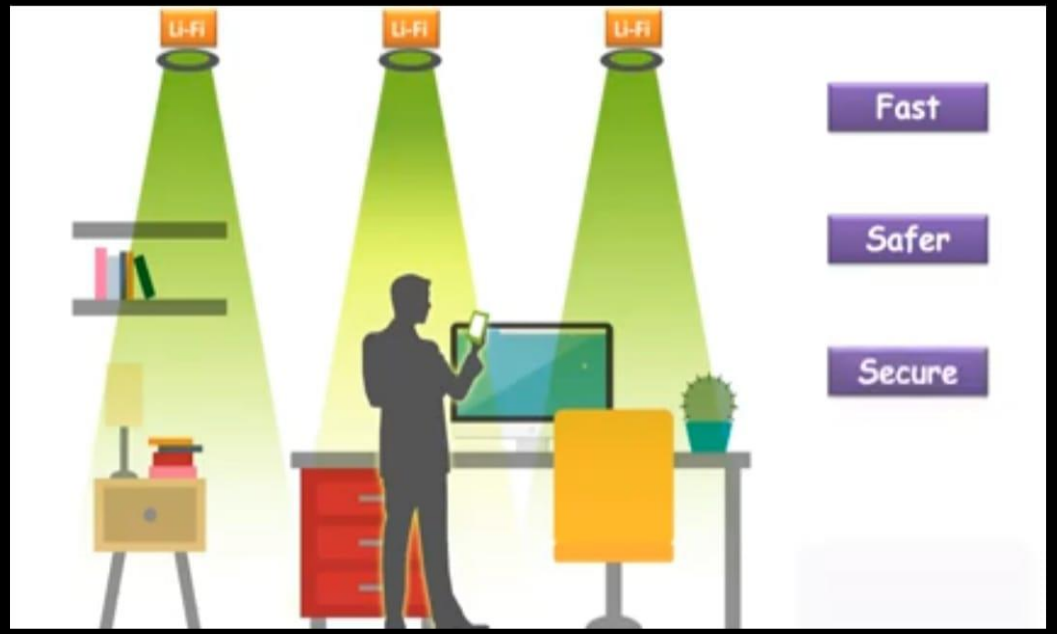


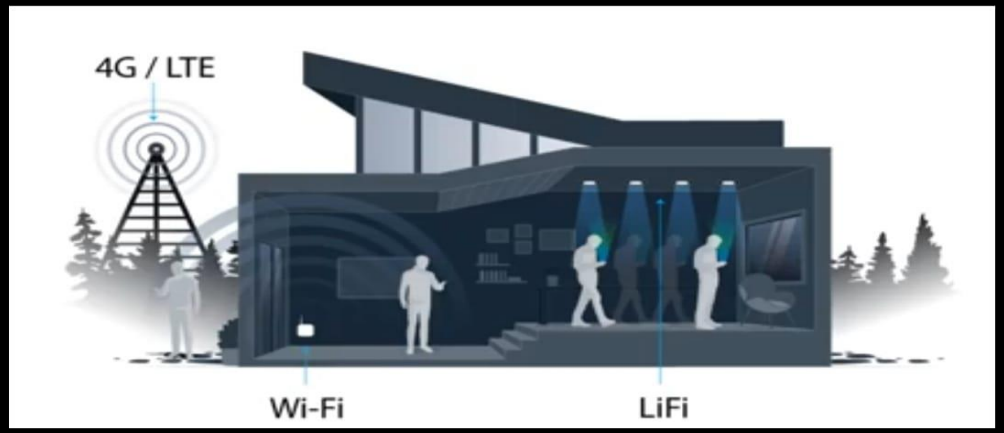
APPLICATIONS(CONT…)

- **Airlines:** It can also be used on Li-Fi passenger aircraft.
- To provide passengers with internet access while in the air.
- **Street Lamps:** Even led lights can become a way of using the outdoor Li-Fi network making it possible to stay connected while walking around the city.
- If Li-Fi technology can be adapted to our street lights , then our streets can provide us with free and fast internet.
- These are some of the areas where Li-Fi technology can be used.

ADVANTAGES

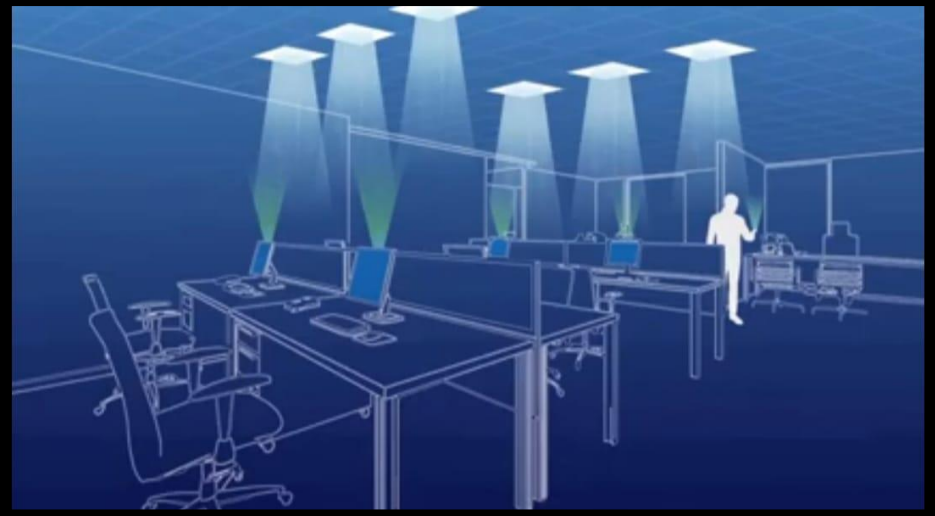
- Larger bandwidth
- High efficiency
- More availability
- High security
- Thousands and millions of street lamps can be converted to Li-Fi spots.
- No license needed.
- Safe for health
- Has low implementation and maintenance cost.





DISADVANTAGES

- Light can’t pass through objects
- High installation cost of the VLC systems
- Interferences from external light sources like sun, light, normal bulbs, opaque materials.
- A major challenge facing Li-Fi is how the receiving device will transmit back to transmitter.
- We cannot move to other rooms unless there are wired bulbs too.
- It has a short range.



CONCLUSION

- With this technology, we can save up to 100 times energy by performing data communication and lighting tasks on a single device.
- In the future Li-Fi technology seems to be a technology that will complement all existing technologies rather than replacing other wireless technologies.
- Because Li-Fi provides short range communication in other words we can use Wi-Fi and other telephone communications in places where we need wide coverage and Li-Fi technology in places where we want short range but safe and fast communication.
- In the future, it may lead to the realization of the Internet of Things (IOT) by enabling more than 100 devices to connect to the Internet with a single distributor device with Li-Fi technology.

REFERENCES

- www.slideshare.net
- www.Wikipedia.org
- Purelifi.com
- www.studymafia.org
- A review of Li-Fi Technology: Kanchan Tiwari Swami; Asmita A. Moghe; IEEE 2020
- Li-Fi based Data transmission for underwater communication: Vismaya V Nair; Sridhar N; Venkateswaran K; IEEE 2021.
- Visible Light Communication (Li-Fi Technology): Asjad Raza; Haider Mehdi; Zakir Hissain; Muhammad Arif; Shabbir Hussain; IEEE 2021.

THANK YOU