Light has been used for making objects visible to the naked eye. In addition, the same light can be used to send information.

it is flashing off and on it cannot be considered to be a useful illumination source, so it is not really VLC by our definition. Now imagine that the flash light is switched on and off extremely quickly via a computer, then we cannot see the data and the flash light appears works by switching the current to the LEDs off and on at a very high rate,[[5]](https://en.wikipedia.org/wiki/Li-Fi" \l "cite_note-nanoseconds-5) too quick to be noticed by the human eye

LEDs are better than existing incandescent lamps in terms of long life expectancy, high tolerance to humidity, low power consumption, and minimal heat generation, fast switching times.

[LEDs](https://en.wikipedia.org/wiki/LED) for up to 10Gbits/s. Low rate[[*vague*](https://en.wikipedia.org/wiki/Wikipedia:Vagueness)] data transmissions at 1.4 kilometres (0.6 and 1.2 mi) were demonstrated.Spectrum of Radio wave is 30GHz.VL is 300THz. 10000 times. Acord to statistics, 14 billion LED lamps are already available in the world ready to transmit the data. And who are the receivers, photodetectors, solar panels, image sensors which are group of PD, may be you can go for MIMO system, basic receiver everyone has mobile camera. We have transmitters, receivers , data, you just need to know how to use it.

VIDEO

A simple RC circuit +2 grade student can build.

Modeling

Mobile light

Noise, golden section search algo.

**Visible light communication** (**VLC**) is a data communications variant which uses [visible light](https://en.wikipedia.org/wiki/Visible_light) between 400 and 800 [THz](https://en.wikipedia.org/wiki/Hertz) (780–375 nm). VLC is a subset of [optical wireless communications](https://en.wikipedia.org/wiki/Optical_wireless_communications) technologies.

The technology uses [fluorescent lamps](https://en.wikipedia.org/wiki/Fluorescent_lamp) (ordinary lamps, not special communications devices) to transmit signals at 10 kbit/s, or [LEDs](https://en.wikipedia.org/wiki/LED) for up to 500 Mbit/s. Low rate[[*vague*](https://en.wikipedia.org/wiki/Wikipedia:Vagueness)] data transmissions at 1 and 2 kilometres (0.6 and 1.2 mi) were demonstrated.[[1]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-vlcc-sensor-1)[[2]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-vlcc-lighthouse-2) [RONJA](https://en.wikipedia.org/wiki/RONJA) achieves full Ethernet speed (10 Mbit/s) over the same distance thanks to larger optics and more powerful LEDs.

Specially designed electronic devices generally containing a [photodiode](https://en.wikipedia.org/wiki/Photodiode) receive signals from light sources,[[1]](https://en.wikipedia.org/wiki/Visible_light_communication" \l "cite_note-vlcc-sensor-1)although in some cases a cell phone camera or a digital camera will be sufficient.[[3]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-vlcc-about-3) The image sensor used in these devices is in fact an array of photodiodes (pixels) and in some applications its use may be preferred over a single photodiode. Such a sensor may provide either multi-channel communication (down to 1 pixel = 1 channel) or a spatial awareness of multiple light sources.[[1]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-vlcc-sensor-1)

VLC can be used as a communications medium for [ubiquitous computing](https://en.wikipedia.org/wiki/Ubiquitous_computing), because light-producing devices (such as indoor/outdoor lamps, TVs, traffic signs, commercial displays and car [headlights/taillights](https://en.wikipedia.org/wiki/Automotive_lighting)[[4]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-vlcc-its-4)) are used everywhere.[[3]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-vlcc-about-3) Using visible light is also less dangerous for high-power applications because humans can perceive it and act to [protect their eyes](https://en.wikipedia.org/wiki/Laser_safety) from damage.

The history of Visible Light Communications (VLC) dates back to the 1880s in Washington, D.C. when the Scottish-born scientist [Alexander Graham Bell](https://en.wikipedia.org/wiki/Alexander_Graham_Bell) invented the [photophone](https://en.wikipedia.org/wiki/Photophone" \o "Photophone), which transmitted speech on modulated sunlight over several hundred meters. This pre-dates the transmission of speech by radio.

More recent work began in 2003 at Nakagawa Laboratory, in [Keio University](https://en.wikipedia.org/wiki/Keio_University), [Japan](https://en.wikipedia.org/wiki/Japan), using [LEDs](https://en.wikipedia.org/wiki/LEDs) to transmit data by visible light. A prototype of VLC had been presented by three undergraduate students at [Universidad de Buenos Aires](https://en.wikipedia.org/wiki/Universidad_de_Buenos_Aires) in 1995, resorting to the amplitude modulation of a 532 nm laser diode of 5 mW and photodiodes detector. Since then there have been numerous research activities focussed on VLC, notably by [Smart Lighting Engineering Centre](http://www.bu.edu/smartlighting), [Omega Project](http://www.ict-omega.eu/), [COWA](http://cowa.psu.edu/), [ByteLight, Inc.](http://www.bytelight.com/),[D-Light Project](http://www.visiblelightcomm.com/), [UC-Light Centre](http://www.uclight.ucr.edu/), and work at [Oxford University](http://www.eng.ox.ac.uk/communications/research/optical-communications).

In 2006, researchers from CICTR at Penn State proposed a combination of [power line communication](https://en.wikipedia.org/wiki/Power_line_communication) (PLC) and white light LED to provide broadband access for indoor applications.[[5]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-5) This research suggested that VLC could be deployed as a perfect last-mile solution in the future.

In January 2010 a team of researchers from [Siemens](https://en.wikipedia.org/wiki/Siemens) and [Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute](https://en.wikipedia.org/wiki/Fraunhofer_Institute_for_Telecommunications" \o "Fraunhofer Institute for Telecommunications) in Berlin demonstrated transmission at 500 Mbit/s with a white LED over a distance of 5 metres (16 ft), and 100 Mbit/s over longer distance using five LEDs.[[6]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-6)

The VLC standardization process is conducted within [IEEE Wireless Personal Area Networks](https://en.wikipedia.org/wiki/IEEE_802.15) working group (802.15).

In December 2010 [St. Cloud, Minnesota](https://en.wikipedia.org/wiki/St._Cloud,_Minnesota), signed a contract with LVX Minnesota and became the first to commercially deploy this technology.[[7]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-7)

In July 2011 a live demonstration of [high-definition video](https://en.wikipedia.org/wiki/High-definition_video) being transmitted from a standard LED lamp was shown at [TED Global](https://en.wikipedia.org/wiki/TED_(conference)).[[8]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-8)

Recently, VLC-based indoor positioning system has become an attractive topic. ABI research [[1]](https://www.abiresearch.com/press/led-and-visible-light-communications-could-be-key-) forecasts that it could be a key solution to unlocking the $5 billion "indoor location market". Publications have been coming from Nakagawa Laboratory,[[9]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-9)[[10]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-10) COWA at Penn State[[11]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-11)[[12]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-12) and other researchers around the world.[[13]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-13)[[14]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-14)

Another recent application is in the world of toys, thanks to cost-efficient and low-complexity implementation, which only requires one microcontroller and one LED as optical front-end.[[15]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-15)

VLCs can be used for providing security.[[16]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-16)[[17]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-17) They are especially useful in body sensor networks and personal area networks.

Recently Organic LEDs ([OLED](https://en.wikipedia.org/wiki/OLED)) have been used as optical transceivers to build up VLC communication links up to 10 Mbit/s.[[18]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-18)

In October 2014, Axrtek launched a commercial bidirectional RGB LED VLC system called MOMO that transmits down and up at speeds of 300 Mbit/s and with a range of 25 feet.[[19]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-19)

In May 2015, Philips collaborated with supermarket giant Carrefour to deliver VLC location-based services to shoppers' smartphones in a hypermarket in Lille, France.[[20]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-20) Indoor positioning systems based on VLC[[21]](https://en.wikipedia.org/wiki/Visible_light_communication#cite_note-21) can be used in places such as hospitals, eldercare homes, warehouses, and large, open offices to locate people and control indoor robotic vehicles.