

Smart Class Using Li-Fi Technology

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-----ABSTRACT-----

In modern era Smart classes is a new technology movement that is fast becoming an imperative for every progressive schools and colleges in world .It, is an in-the-classroom technology solution that has transformed teaching and learning, reaching out to millions of schools and colleges. Using Smart class teachers show the class a 2D/3D animation on a large screen. They can explain the fine points of the topic, zoom in to show the relevant visuals, freeze and annotate when and where they needs to emphasise along with engaging animations, colours, and sounds The teachers gain complete attention and interest of every child in the class. Every child gets a visual input on what, where, when and how anything happens and the concepts are well understood and internalised. In this technology all the network computers are connected to the server using the wired LAN technology. The physical transmission medium for a wired LAN involves cables, mainly twisted pair or fiber optics. But there are many disadvantages of using LANs like it is wired and therefore more difficult to setup drilling holes in wall, running cables in lofts etc, fitting sockets and redecorating hence the cost of installing the equipment is greater, more time consuming to set up, not as flexible, can only use where there is a socket, and need to be maintained by skilled technicians, and even a virus can spread more easily. So, to avoid all these disadvantages a Modern Technology can be used named Li-Fi (Light Fidelity) technology. Li-Fi can be thought of as a light-based Wi-Fi. That is, it uses light instead of radio waves to transmit information means replace the light by the energy efficient LED lightening which could enhance the capability and functionality by providing light in high speed data communication using Li-Fi modem. Li-Fi changes the intensity of the light in a certain way that a human eye can't recognise it, but the detector at the other end of the link would convert this change in bit stream.

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I. INTRODUCTION

It is well known that how helpful it is to remember something that is taught visually to us rather than the one that is read through pages of books. Just imagine, how beneficial would it be for students to understand a chapter visually in classrooms. The concept of smart class education is indeed a blessing to the students of the 21st Century. Technology is changing the way life functions and if it's for the good, then why not go for it. There are numerous advantage of Smart class but if it will used with Li-Fi technology, the more advantages will be added. Li-fi basically known as "light fidelity" is an outcome of twenty first century. The basic ideology behind this technology is that the data can be transmitted through LED light whose intensity varies even faster than the human eye. As the transmission of the data takes place through the light emitting diodes (LED's) the amount is comparatively small .In modern times, it is called as the optimized version of WI-FI .The advantageous thing is the wireless communication which decreases the cost enormously.

II. COMPONENTS USED FOR SMARTCLASS USING LI-FI TECHNOLOGY

The main components used for the Li-Fi network in the Smart classes are as follows:

- a. **Transmission Source:** A high brightness white LED which acts as transmission source.
- b. **Receiving Element:** A silicon photodiode which shows good response to visible wavelength region serving as the receiving element fitted over the computer.
- c. **Server:** It is a database of the Smart means it stores all the data of the smart class.
- d. **Interactive Board:** It acts as a input device and monitor, allows us to control the application by simply touching the board. It connects with the computer and the projector. It usually hangs on the wall or the stand.
- e. **Computer:** It loads an application of Smart class and connected to the server, projector and interactive board.
- f. **Projector:** It is used to project the image on the interactive board, and placed in front of the interactive board.

III. HOW IT WILL WORK?

When the system starts a constant current is applied to an LED light bulb then from the bulb a constant stream of photons are emitted, that light is called as visible light. But if the current is varied slowly the output intensity of the light dims up and down. For the communication as soon as, LED starts glowing, photo detector or light sensor on computer will detect light and get a binary 1 otherwise binary 0. The photo detector registers a binary one when the LED is on; and a binary zero if the LED is off. Flashing a LED certain times will build up a data to transmit. Flashing of light is detected by the photo detector or light sensor and it will receive a data and that data will display over the smart board with the help of the projector attached to the computer and smart board. Further enhancements can be made in this method, like using an array of LEDs for parallel data transmission, or using mixtures of red.

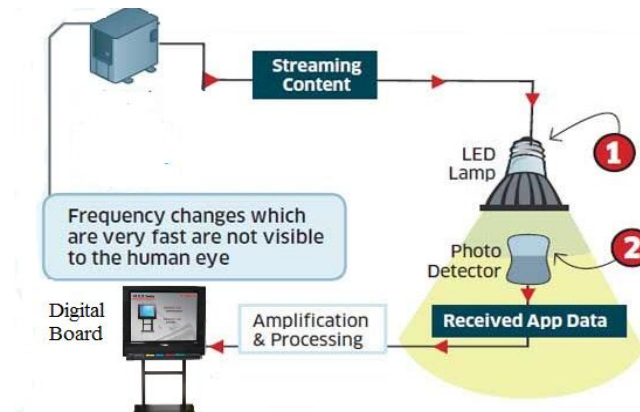


Fig: How Li-Fi is used in Smart class

We can also use Wi-Fi technology for it but as it uses the radio waves and radio frequency communication requires radio circuits, antennas and complex receivers which are also harmful for the human being, whereas Li-Fi is much simpler and uses direct modulation methods similar to those used in low-cost infra-red communications devices such as remote control units. Infra-red communication is limited in power due to eye safety requirements, whereas LED light bulbs have high intensities and can achieve very large data rates and not harmful for human being also.

IV. ADVANTAGE OF USING THIS SMARTCLASS USING LI-FI TECHNOLOGY

The main advantages of this using this technology is as follows:

- a. The installation of cables is time consuming and expensive. The advantages of not doing so are apparent.
- b. The amount of work required and the time taken to complete it are significantly reduced.
- c. The network is accessible in places where wiring would have been difficult or impossible with no cables linking computers together, cable-related faults and network downtime are minimized.
- d. Where a wireless network is in place, teachers or students can have continuous access to the network, even as they move with their equipment from class to class.
- e. The space over which a wireless network operates is not planar but spherical. Therefore, in a multi-level site, network access is available in rooms above or below the access point, without the need for additional infrastructure.
- f. In a location within a school/college where network access is required occasionally, desktop computers can be placed on trolleys and moved from location to location. They can also be located in areas where group work is taking place. As they are connected to the network, documents and files can be shared, and access to the Internet is available, enhancing group project work.
- g. This network allows students to access the Smart classes by computers throughout the school.
- h. One of the greatest benefits of installing a network at a school/college is the fact that all of the software can be loaded on server. Then if we want that software we can copy that from that server by some easy steps.

V. DISADVANTAGE OF USING SMARTCLASS USING LI-FI TECHNOLOGY

The main disadvantages of this using this technology is as follows:

- a. The main problem is that light can't pass through objects, so if the receiver is inadvertently blocked in any way, then the signal will immediately cut out. If the light signal is blocked, or when you need to use your device to send information you can seamlessly switch back over to radio waves, Harald says.
- b. Reliability and network coverage are the major issues to be considered by the companies while providing VLC services. Interference from external light sources like sun light, normal bulbs; and opaque materials in the path of transmission will cause interruption in the communication.
- c. High installation cost of the this systems can be complemented by large-scale implementation of VLC though adopting this technology will reduce further operating costs like electricity charges, maintenance charges etc.

- d. We still need Wi-Fi we still need radio frequency cellular systems. You can't have a light bulb that provides data to a high-speed moving object or to provide data in a remote area where there are trees and walls and obstacles behind.

FUTURE SCOPE

The possibilities are numerous and can be explored further. If this technology can be put into practical use, every bulb in the school or college can be used something like a Wi-Fi hotspot to transmit wireless data and we will proceed toward the cleaner, greener, safer and brighter future. The concept of Li-Fi is currently attracting a great deal of interest, not least because it may offer a genuine and very efficient alternative to radio-based wireless. As a growing number of people and their many devices access wireless internet, on one way, it can transmit the data at higher rate and on the other it is very cheap as compared with WI-FI and LANs. Smart class using Li-Fi can also be used in the companies for the providing training. Hence the future applications of the Smart class using Li-Fi can be predicted and extended to different platforms and various walks of human life.

CONCLUSION

The structure and arrangement of traditional classroom space does not go with changes happened in educational agents, methodology and social context. Smart classrooms provide an interesting technical solution that does not necessarily guarantee improved student learning based on grades measured. Overall, students want more engaging ways to learn and are open to technology in their classrooms as it seems like a natural progression. It is necessary to support the technology with appropriate learning styles and pedagogies and then assess the appropriateness of the technical solution. Students seem to be more passive learners and require more effort from educators to get them to engage in traditional learning approaches. The difficulty for the educators is the additional burden in using these methods in classroom environments with large number of students. Smart class rooms has the potential to play a supporting role for educators in gaining student engagement and getting measurable gains in student learning and exam performance. Today more than 8000 schools in India have adopted the Smart Class technology. Very soon it will touch every school/ college in India and rest of the world. Even if we are using Li-Fi it will not harmful for the human being as light wave have no harmful effect over the human being and as we are using almost existing infrastructure, its cost of installation is comparative less than the present technology used.

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