IMPLEMENTATION OF OPTICS COMMUNICATION SYSTEM

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***Abstract*: Optical communication technology that uses light propagating in free space to wirelessly transmit data for telecommunications or computer networking. Outer space means vacuum, or something similar. This contrasts with using solids such as optical fiber cable. Optics technology used with reflecting telescopes which actively shapes a telescope's mirrors to prevent deformation due to external influences such as wind, temperature, mechanical stress. Without active optics, the construction of lengthy of class telescopes is not possible, nor would telescopes with segmented mirrors be feasible. One major challenge in accomplishing the full range of capabilities on a chip is that by definition, no single optical material can implement every desired optical functionality well due to conflicting requirements. Different materials each have their individual strengths, and so to maximise system performance, multiple materials need to be integrated onto a single chip in a so called heterogeneous or hybrid integration process. In this paper discuss about enable to a full range of optical functions and its communication, materials with diverse physical properties must be integrated and processed together and interconnected with low loss. Diffraction gratings can be etched into the wave guide. Long optical cavities are very sensitive to the mirror alignment. A control circuit can be used to peak power. One possibility is to perform small rotations with one end mirror. If this rotation is about the optimum position, no power oscillation occurs.**

***Keywords*: Optics communication, grating, optical functions, wave guides.**

I. Introduction:

Point-to-Point optical links can be implemented using infrared laser light, although low-data-rate communication over short distances is possible using LEDs. Infrared Data Association (IrDA) technology is a very simple form of outer-space optical communications[1]. On the communications side the optical communication in outer space technology is considered as a part of the optical wireless communications applications. The reliability of outer-space optical communications units has always been a problem for commercial telecommunications. Consistently, studies find too many dropped packets and signal errors over small ranges (400 to 500 meters). Outer-space optics can be used for communications between spacecraft.

1.1. Optical Integrated Circuit:

There is also another important distinction, in that optical integrated circuits as shown in fig.1 operate directly on the photons themselves to process them (and so also on encoded data if present) whereas electronic circuits operate solely on the data[2]. This presents a range of capabilities not present in the electronic domain. It contain multiple optically interconnected components, fabricated on the same substrate and jointly performing various functions of processing optical signals (typically in the visible or near infra-red wavelength ranges).

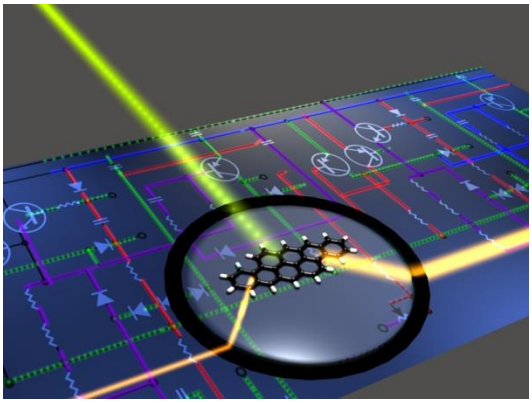

Fig.1. optical integrated circuit

Devices with all components manufactured by introducing impurities or structurising the substrate material. Whilst there are direct analogues in the optical domain for devices such as transistors for switching, frequency mixers, etc, with the exception of a few restricted application areas, the idea with integrated optics is not to build an optical equivalent of an electronic circuit (so no optical computers!). Such capabilities make applications in telecommunications, defence, sensing, metrology, instrumentation, astronomy, quantum processing, etc viable.

II. Integrated Circuit:

An integrated circuit or monolithic integrated circuit (also referred to as an IC, a chip, or a microchip) is a set of electronic circuits as shown in fig.2 on one small flat piece (or "chip") of semiconductor material, normally silicon[3]. The integration of large numbers of tiny transistors into a small chip results in circuits that are orders of magnitude smaller, cheaper, and faster than those constructed of discrete electronic components. The IC's mass production capability, reliability and building-block approach to circuit design has ensured the rapid adoption of standardized ICs in place of designs using discrete transistors. ICs are now used in virtually all electronic equipment and have revolutionized the world of electronics. Computers, mobile phones, and other digital home appliances are now inextricable parts of the structure of modern societies, made possible by the small size and low cost of ICs.

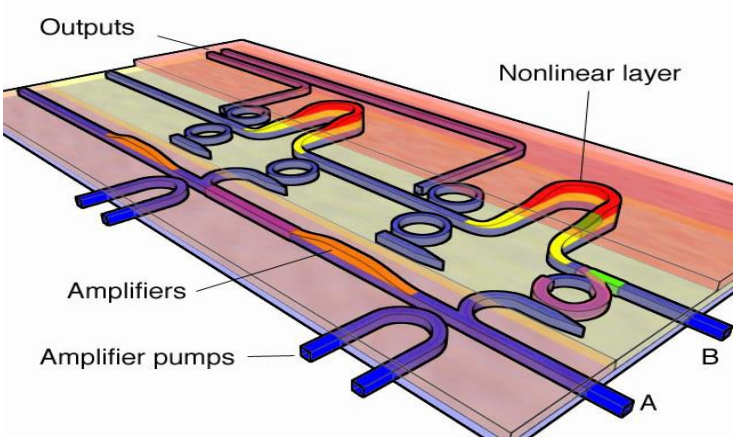

Figure 2 - integration circuit platform

III. Optical sensors:

A sensor which measures the physical quantity of light rays and convert it into electrical signal which can be easily readable by user or an electronic instrument/device is called optical sensor. Optical sensors are loved by IoT experts, as they are practical for measuring different things simultaneously[4]. The technology behind this sensor allows it to monitor electromagnetic energy, which includes, electricity, light and so on.Due to this fact, these sensors have found use in healthcare, environment monitoring, energy, aerospace and many more industries. With their presence oil companies, pharmaceutical companies and mining companies are in a much better position to track environmental changes while keeping their employees safe. Their main use can be found in Ambient light detection, digital optical switches, optical fibres communications, due to Electrical isolation best suited for oil and gas applications, civil and transportation fields[5], High speed network systems, elevator door control, assembly line part counters and safety systems.

3.1.Types of optical sensors:

Photo detector: It uses light sensitive semiconductor materials like photocells, photodiodes or phototransistors to work as photo detector.

Fiber Optics : Fibers optics carry no current, So its immune to electrical & electromagnetics interference and even in damaged condition no sparking or shock hazard happens.

Pyrometer : It estimates the temperature of an object by sensing the color of the light and Objects radiate light according to their temperature and produce same colors at same temperature[6]. It is clear that IoT has become incredibly popular, and current trends show that it is the future. It simply helps with automation of various processes, making these systems quite useful for both regular consumers and businesses. When you consider the fact that all of the measured data is collected and can be analyzed, it is obvious that IoT is going to become even smarter in the future.

IV. Optical filter:

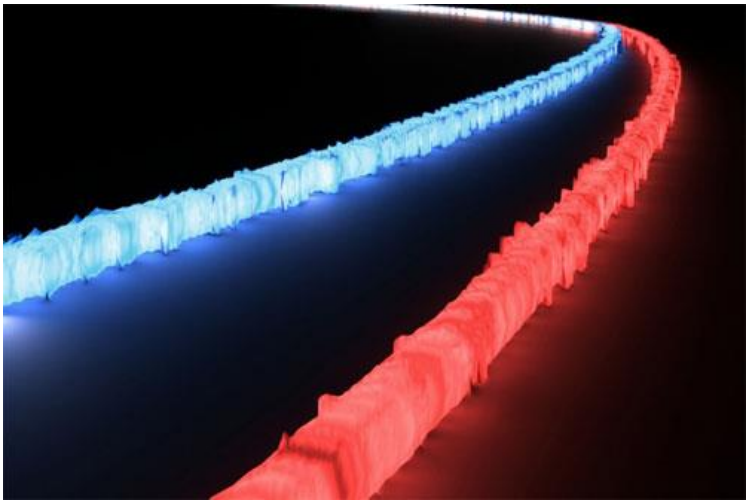

Fig.3 optical filter

As shown in above fig.3 optical filter on a chip that can process optical signals from across an extremely wide spectrum of light at once, something never before available to integrated optics systems that process data using light.A transportable miniaturized fiber-pigtailed measurement system is presented which allows quantitative fluorescence detection in micro liquid handling systems[7]. The micro liquid handling chips are made in silica on silicon technology and the optical functionality is monolithically integrated with the micro fluidic channel system. This results in inherent stability and photolithographic alignment precision[8]. Permanently attached optical fibers provide a rugged connection to the light source, detection, and data processing unit, which potentially allows field use of such systems.

V. Conclusion:

Active optics should not be confused with adaptive optics, which operates on a much shorter timescale to compensate for atmospheric effects, rather than for mirror deformation[9]. The influences that active optics compensate (temperature, gravity) are intrinsically slower (1 Hz) and have a larger amplitude in aberration. Adaptive optics on the other hand corrects for atmospheric distortions that affect the image at 100–1000 Hz.
Truth is ideas are cheap and "paper designs" are plentiful. The difference between an idea that gets ignored and one that gets attention is a working prototype[10]. Prototyping also plays a critical engineering role in any new optical product development. Optical design software is highly accurate and predictable. However, the interaction between optical elements and opto-electronic components, mechanics, and the human visual system is complex and best understood by building and testing system prototypes.

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