"To Develop Nobel Prize "QUANTUM DOT" Theory By Verilog Programming & Verify by Test Programming"

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Abstract - Quantum dot is a generating technique to generate quantum dot of different time interval by change the wave length of different type radiation wave. To develop quantum dot equation by Verilog programming. In order to develop the equation into programming language by define the all the parameter in Verilog system. All the bits of the input and output are fix bit. All the interfacing parameter between equations into the Verilog syntex is fixing. Interfacing between Verilog programming and Test bench programming is verify the Verilog programming of the equation by the test bench programming. Electronic Design Automation software is used to get the output of Verilog programming. Electronic Design Automation software is used to get the output of Test bench programming. Output of Verilog programming and output of the test bench programming is verifying the programming of equation quantum dot.Both output of Verilog and test bench programming show in wave form on the software.

KEYWORDS: Quantum dot, Verilog Programming, Test Bench Programming, Software, Verification, Epwave form.

1. INTRODUCTION

Quantum dots also called semiconductor nanocrystals are semiconductor particles a few nanometers in size, having optical and electronic properties that differ from those of larger particles as a result of quantum. They are a central topic in nanotechnology and materials science. When the quantum dots are illuminated by UV light, an electron in the quantum dot can be excited to a state of higher energy. In the case of a semiconducting quantum dot, this process corresponds to the transition of an electron from the valence band to the conductance band. The excited electron can drop back into the valence band releasing its energy as light. This light emission (photoluminescence) is illustrated in the figure on the right. The color of that light depends on the energy difference between the conductance band and the valence band, or the transition between discrete energy states when the band structure is no longer well-defined in qds.Nanoscale semiconductor materials tightly confine either electrons or electron holes. The confinement is similar to a three-dimensional particle in a box model. The quantum dot absorption and emission features correspond to transitions between the discrete quanta mechanically allowed energy levels in the box that are reminiscent of atomic spectra. For these reasons, quantum dots are sometimes referred to as artificial atoms, emphasizing their bound and discrete electronics states the like naturally occurring atoms Or molecules. It was shown that the electronic wave functions in quantum dots resemble the ones in real atoms.By coupling two or more such quantum dots, an artificial molecule can be made, exhibiting hybridization even at room temperature. Precise assembly of quantum dots can form super lattices that act as artificial solid-state materials that exhibit unique optical and electronic properties. Quantum dots have properties intermediate between bulk semiconductors and discrete atoms or molecules. Their optoelectronic properties change as a function of both size and shape. Larger qds of 5–6 nm diameters emit longer wavelengths, with colors such as orange, or red. Smaller qds (2–3 nm) emit shorter wavelengths, yielding colors like blue and green. However, the specific colors vary depending on the exact composition of the QD.Potential applications of quantum dots include single-electron-transistors, solar cell leds cells, lasers, sources,second, computing,cell,research,microscopy,and me dical imaging Their small size allows for some qds to be suspended in solution, which may lead to their use in inkjet printing, and spin coating. They have been used in Langmuir–Blodgett films. These processing techniques result in less expensive and less time-consuming methods of semiconductor fabrication. Quantum dots are particularly promising for optical applications due to their high extinction coefficient and ultrafast optical nonlinearities with potential applications for developing all-optical systems.They operate like a single-electron transistor and show the Coulomb blockade effect. Quantum dots have also been suggested as implementations of qubits for quantum information processing,andas active elements for thermoelectrics.Tuning the size of quantum dots is attractive for many potential applications. For instance, larger quantum dots have a greater spectrum shift toward red compared to smaller dots and exhibit less pronounced quantum properties. Conversely, the smaller particles allow one to take advantage of more subtle quantum effects.A device that produces visible light, through energy transfer from thin layers of quantum wells to crystals above the layers. Being zero-dimensional, quantum dots have a sharper density of states than higher-dimensional structures. As a result, they have superior transport and optical properties. They have potential uses in diode lasers, amplifiers, and biological sensors.[67] Quantum dots may be excited within a locally enhanced electromagnetic field produced by gold nanoparticles, which then can be observed from the surface plasmon resonance in the photo luminescent excitation spectrum of (cdse)zns nanocrystals. High-quality quantum dots are well suited for optical encoding and multiplexing applications due to their broad excitation profiles and narrow/symmetric emission spectra. The new generations of quantum dots have far-reaching potential for the study of intracellular processes at the single-molecule level, high-resolution cellular imaging, long-term in vivo observation of cell trafficking, tumor targeting, and diagnostics.Cdse nanocrystals are efficient triplet photosensitizers.

Laser excitation of small cdse nanoparticles enables the extraction of the excited state energy from the quantum dots into bulk solution, thus opening the door to a wide range of potential applications such as photodynamic therapy, photovoltaic devices, molecular electronics, and catalysis. Interfacing between equation of quantum dot and Verilog programming. It is never develop any type of programming language of this equation and never verify by test bench programming. My object to develop the Verilog programming of this equation and verify by test bench programming. The scope of this research is interfacing of multiple programming language and conversion from one domain to another domain.

2. LITERATURE REVIEW

Glassmakers were able to make colored glass by adding different dusts and powders elements such as silver, gold and cadmium and then played with different temperatures to produce shades of glass. In the 19th century, scientist started to understand how glass color depended on elements and heating-cooling techniques. It was also found that for the same element and preparation, the color depended on the dust particles' size. Naturally occurring obsidian glass was used by Stone Age societies as it fractures along very sharp edges, making it ideal for cutting tools and weapons. Glassmaking dates back at least 6000 years, long before humans had discovered how to smelt iron. Archaeological evidence suggests that the first true synthetic glass was made in Lebanon and the coastal north Syria, Mesopotamia or ancient Egypt. The earliest known glass objects, of the mid-third millennium BC, were beads, perhaps initially created as accidental by-products of metalworking (slags) or during the production of faience, a pre-glass vitreous material made by a process similar to glazing. Early glass was rarely transparent and often contained impurities and imperfections, and is technically faience rather than true glass, which did not appear until the 15th century BC. However, red-orange glass beads excavated from the Indus Valley Civilization dated before 1700 BC (possibly as early as 1900 BC) predate sustained glass production, which appeared around 1600 BC in Mesopotamia and 1500 BC in Egypt. During the Late Bronze Age there was a rapid growth in glass making technology in Egypt and Western Asia. Archaeological finds from this period include coloured glass ingots, vessels, and beads. Much early glass production relied on grinding techniques borrowed from stone working, such as grinding and carving glass in a cold state. Dichroic glass has one or several coatings in the nanometer-range (for example metals, metal oxides, or nitrides) which give the glass dichroic optical properties. Also the blue appearance of some automobile windshields is caused by dichroic. The Vavilov State Optical Institute in St Petersburg, Russia (named after Sergey Ivanovich Vavilov) is a research institute in optics in Russia. It works both in pure and applied optics. It was established in 1918 along the lines of a proposal by the physicist Dimitri Rozhdestvensky, who was the first director, a post he held until 1932.It is part of the Shvabe holding. It designs optical systems for many applications, including .Russian reconnaissance satellites. It publishes the Journal of Optical Technology Alexander Lwowitsch Efros is a Russian physicist. Efros is the co-discoverer of semiconducting nanocrystals known as quantum dots.Efros graduated as a physical engineer in 1973 from the Leningrad Technological Institute and received his doctorate there in 1978. He was a scientist at the Ioffe Institute in Leningrad from 1981 to 1990, at which time he moved to the West. In the 1980s, Alexey Ekimov, Alexei A. Onuschenko and Efros, discovered semiconductor nanocrystals while studying doped glasses. They correctly determined the quantum mechanical origin of the size-dependent optical properties of nanocrystals. He was at the Technical University of Munich from 1990 to 1992, at the Massachusetts Institute of Technology as visiting scientist from 1992 to 1993. Since 1993 he has been an advisor at the Laboratory. IN 2001, Efros became a Fellow of the American Physical Society. He received the R. W. Wood Prize in 2006 along with Ekimov and Louis E. Brus. In the Alexander von Humboldt Prize in 2008 for his work on quantum dots. In 2013, he received the E. F. Gross Medal of the Russian Optical society for pioneering nanocrystal researched coined the term quantum dots, for demonstrating the first zero-dimensional electronic device that had fully quantized energy states. Reed did research in electronic transport in nanoscale and mesoscopic systems, artificially structured materials and devices, molecular electronics, biosensors and bioelectronic systems, and nanofluidics. He was the author of more than 200 publications, had given over 75 plenary and over 400 invited talks, and held 33 U.S. and foreign patents on quantum effect, heterojunction, and molecular devices. He was the editor in chief of the journal Nanotechnology (2009–2019) and of the journal Nano Futures, and held numerous other editorial and advisory board positions. Reed received his Ph.D. From Syracuse University in 1983. He worked at Texas Instruments from 1983 to 1990, where he demonstrated the first quantum dot device. He had been at Yale School of Engineering and Applied Science since 1990, where he held the Harold Hodgkin son Chair of Engineering and Applied Science. Notable work there included the first conductance measurement of a single molecule, the first single molecule transistor, and the development of CMOS nanowire biosensors.

3. METHODOLOGY

Quantum dot equation is interfacing with Verilog programming. All the parameter of the equation is mapping by Verilog parameter. Data bits of parameter are fixing accordance with Verilog parameter bit. Interconnection between Verilog programs and test bench programming. All this parameter is fixing by both domain bits in distinguish ways. Parameter of quantum dot and test bench programming language is determined by its own domain. The output of the Verilog programming is display on the Electronic design automation software in the Epwave form .Similarly the output of the test bench is shows on Electronic design automation software in the Epware form. Verification of the equation programming in Verilog and test bench programming is match with each other after that display the output. Output of the quantum dot is multiple wave form and multiple signal form.

4. FINDING

Output of the verification of Verilog programming and test bench programming in binary digit and hexa digit by the software is given below:

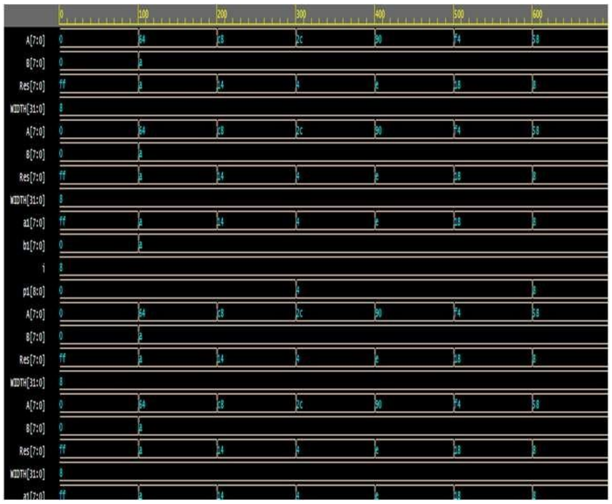

Fig1: Hexa Bit output

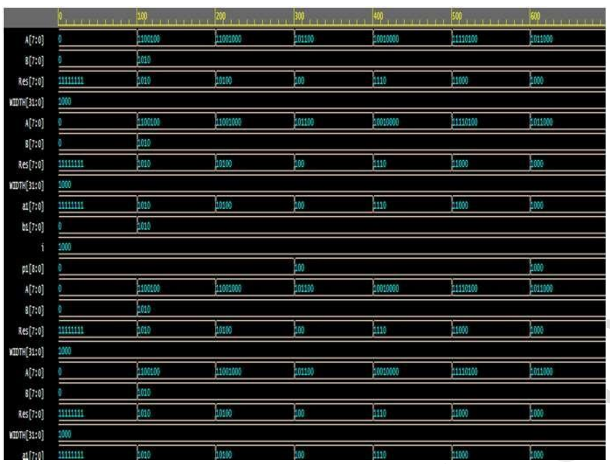

Fig.2 Binary-bit output

5. DISCUSSION

Epwave form generated the output of Verilog programming of the equation in the proper bit format in the form of the binary digit and hexa decimal digit. Verification of both programming of the equation is display in definite time interval .Output of the bit in shows in various time duration.

6. CONCLUSION

The study undertaken contributes the positive outcome of the Epwave form of the Verilog programming and test bench programming and development of the equation of the quantum dot verified by the output of the software of the electronic design automation.

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