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Production of Screencasts and Videos for a Mooc on Digital Electronics

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ABSTRACT: *Massive open online courses (MOOCs) are one of the recent developments in online platform aimed at holistic participation . They are actually potentially disruptive technology, changing how education is delivered and funded across the world. MOOCs are bringing a revolution in solidifying classroom learning concepts to practical learning and is actually turning into a reality. MOOCs are relevant to software researchers and practitioners, not only because they will increasingly receive lifelong education through MOOCs and related technologies, but also because content creation, delivery, and enhancement of MOOCs is evolving into a new form of socially- and cognitively-embedded software development. Thus, delivery of lectures using web technology is now an accessible and relatively straightforward option for universities and teaching staff on global scale. In this project a series of 25 lectures were delivered via screencasts and podcasts. The entire digital electronics was divided into six segments precisely.The project was on production of screencasts and videos for MOOC on Digital Electronics using LTSpice and Pspice.The main incentive was to emphasise on basic concepts of digital electronics ,clarify them in short videos so as to promulgate it in interesting manner in order to enable learning and thinking to go simultaneously. Schematics have been attached along with the videos to give a better insight of the working of the circuits. Feedback from the students via a questionnaire was extremely positive, with flexibility and the ability to repeat lectures cited as the main advantage. However, caution must be exercised in that this is not a mechanism for replacing face-to-face teaching, but is used to provide additional material or to free-up time for more discussion sessions or practical-based teaching. The purpose of this project was to show how images and videos of classroom learnt concepts can enhance student experiences in reference interactions by providing a visual and/or auditory explanation, rather than written step-by-step instructions. This project explores how online screencasting tools, such as Jing, OBS studio can be used to quickly create and share on-the-fly videos and images.*

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I INTRODUCTION

Digital electronics or digital (electronic) circuits are electronics that handle digital signals (discrete bands of analog levels) rather than by continuous ranges as used in analog electronics. All levels within a band of values represent the same information state. Because of this discretization, relatively small changes to the analog signal levels due to manufacturing tolerance, signal attenuation or noise do not leave the discrete envelope, and as a result are ignored by signal state sensing circuitry. In most cases, the number of these states is two, and they are represented by two voltage bands: one near a reference value (typically termed as "ground" or zero volts), and the other a value near the supply voltage. These correspond to the false and true values of the Boolean domain respectively. Digital techniques are useful because it is easier to get an electronic device to switch into one of a number of known states than to accurately reproduce a continuous range of values. Digital electronic circuits are usually made from large assemblies of logic gates, simple electronic representations of Boolean logic functions. LT Spice is freeware computer software implementing a SPICE simulator of electronic circuits, produced by semiconductor manufacturer Linear Technology (LTC) LT spice IV provides a schematic capture and waveform viewer with enhancements and models to speed the simulation of switching regulators. Supplied with LT spice IV are macro models for 80% of LTC's switching regulators and operational amplifiers,

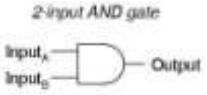
transistors, MOSFETs, and passive components. LT spice IV is node-unlimited and third-party models can be imported. Circuit simulations based on transient, AC, noise and DC analysis can be plotted as well as Fourier analysis. Heat dissipation of components can be calculated and efficiency reports can also be generated. LT spice IV is used within LTC, and by many users in fields including radio frequency electronics, power electronics, digital electronics, and other disciplines. LT spice IV does not generate printed circuit board (PCB) layouts, but net

lists can be imported into layout programs. While LT spice does support simple logic gate simulation, it is not designed specifically for simulating logic circuits.

II SIMULATIONS OF CIRCUITS

Logic gates are electronic circuits that can be used to implement the most elementary logic expressions, also known as Boolean expressions. The logic gate is the most basic building block of combinational logic. There are three basic logic gates, namely the OR gate, the AND gate and the NOT gate. Other logic gates that are derived from these basic gates are the NAND gate, the NOR gate, the EXCLUSIVEOR gate and the EXCLUSIVE-NOR gate.

***2.1. AND GATE*:** The AND gate is a basic digital logic gate that implements logical conjunction - it behaves according to the truth table to the right. A HIGH output (1) results only if both the inputs to the AND gate are HIGH (1). If neither or only one input to the AND gate is HIGH, a LOW output results. In another sense, the function of AND effectively finds the *minimum* between two binary digits, just as the OR function finds the *maximum* between two binary digits. Therefore, the output is always 0, except when all the inputs are 1.



A	B	Output
0	0	0
0	1	0
1	0	0
1	1	1

Fig.1 Circuit Diagram & Truth Table

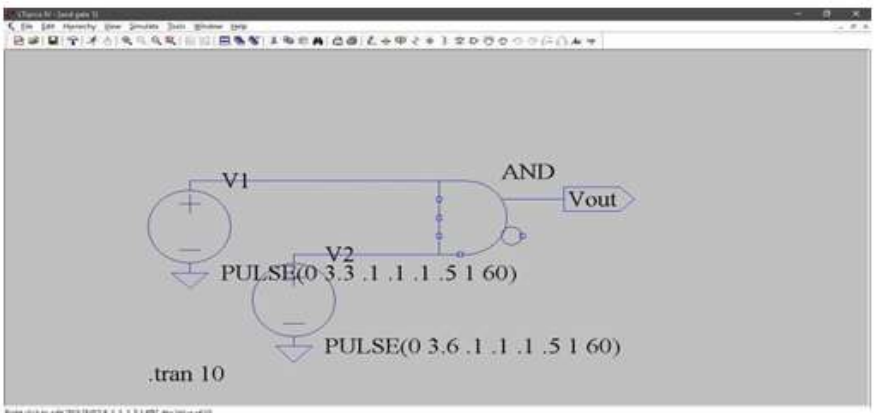


Fig.2 Simulation of And Gate On Lt-Spice

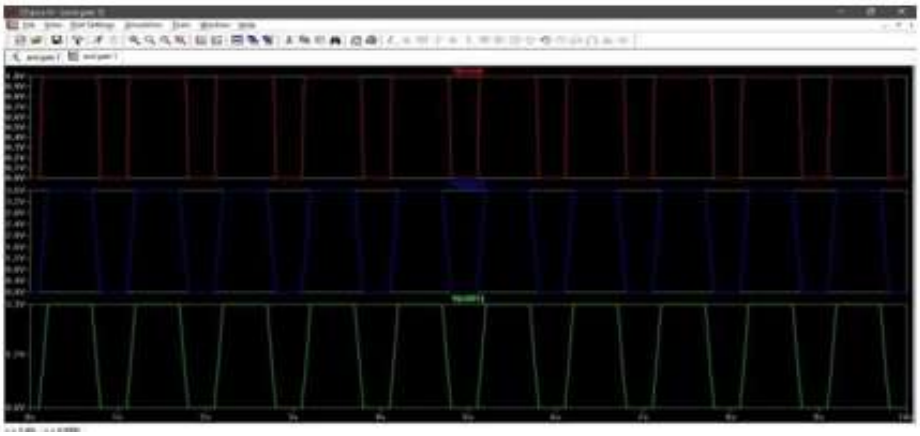
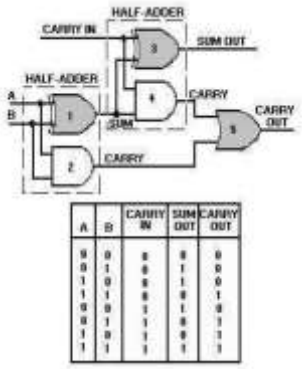


Fig 3. output:-

***2.2. FULL ADDER*:** A full adder circuit is an arithmetic circuit block that can be used to add three bits to produce a SUM and a CARRY output. Such a building block becomes a necessity when it comes to adding binary numbers with a large number of bits. The full adder circuit overcomes the limitation of the half-adder, which can be used to add two bits only.



A	B	CARRY IN	SUM OUT	CARRY OUT
0	0	0	0	0
0	1	0	1	0
1	0	0	1	0
1	1	0	0	1
0	0	1	1	0
0	1	1	0	1
1	0	1	0	1
1	1	1	1	1

Fig. 4. Circuit Diagram and Truth Table

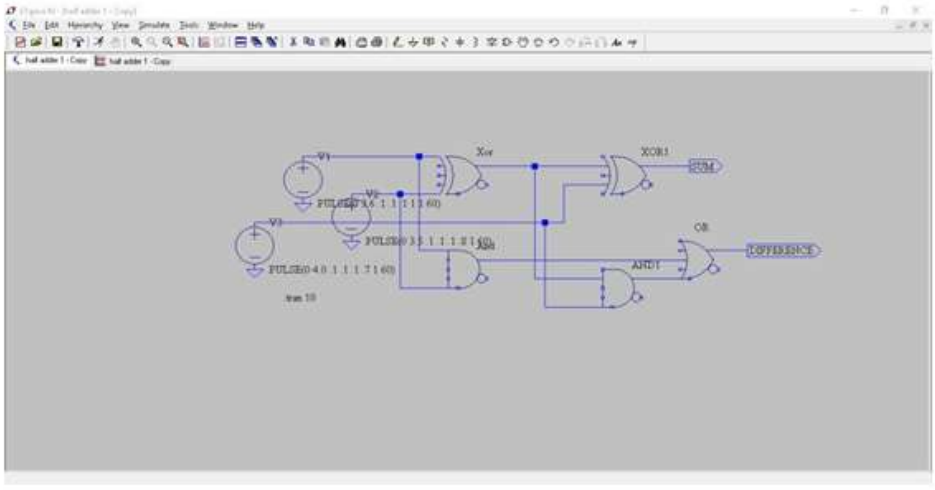


Fig.5.Simulation of Full Adder Using Lt-Spice

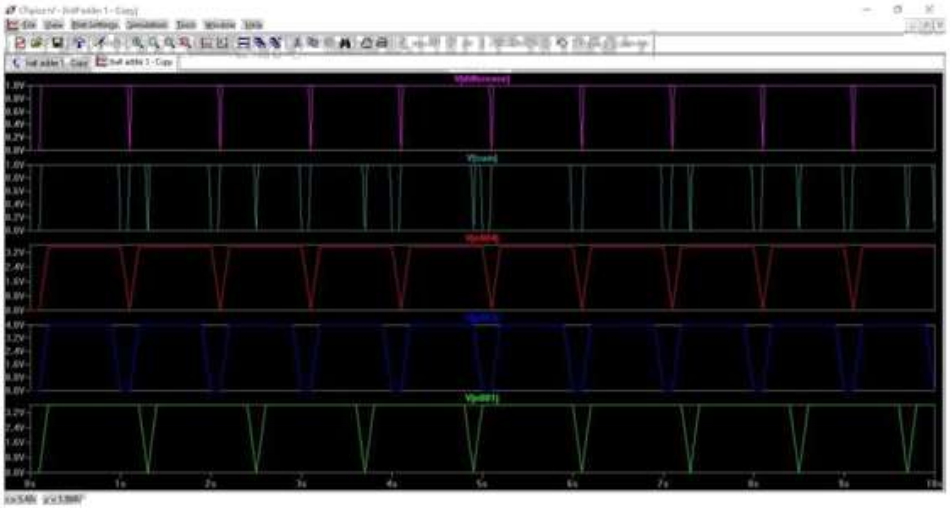


Fig. 6. Output

III. RESULT:

1. The screencasting of videos was done successfully using real time simulation of circuits by creating their schematics firstly and then running it.
2. The softwares used were LTSpice and PSpice for simulating the circuits.
3. The duration of every video stands from 3-10 minutes.
4. Softwares used for screencasting were Jing and OBS studio.
5. The screencasting for MOOC of digital electronics has been done in two languages that is English and French.
6. The screencasting of the topics was done successfully in stipulated time frame.
7. The simulation of circuits using schematics was done coherently.

IV. CONCLUSION:

To work with simulation softwares with higher versions enables one to understand the intricate working of digital circuits when signal is provided to it. It establishes an evidence of the truth tables which are proven by waveforms so generated. Moreover, MOOC lays an emphasize on experiential learning with a background of theoretical knowledge to solidify the root concepts which is necessary in laying strong foundations for out of box inventions, discoveries to take place by future generations to come .

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