**Zoom- “The new normal”**

**By Janvi Saluja**

Amid the Covid-19 pandemic, work from home became the “new normal” for not only many companies but also schools and universities. People look to video conferencing technology to maintain their social and professional life. Due to the current necessary social distancing protocols, video conferencing provides the closest proximity to a face-to-face meeting. Zoom, one of the most popular and widely used video conferencing vendors, has experienced escalation in 2020. As a result, this gave rise to new popular terms such as Zoom bombing and Zoom Fatigue.

**Computer Architecture:**

I was using ACER Aspire 5 and the other person was using an android phone. The laptop has a 720p webcam which is standard and performs well. The color of the webcam can be a little off in tone and the details will be grainy if the lighting is not correct. The audio is clear, and the speakers are loud enough to hear the other party. The Aspire 5 uses a dual microphone array and Acer’s proprietary Purified Voice technology. A graphics processing unit (GPU) is a microprocessor that handles the calculations necessary for 3-D graphics rendering. My laptop uses Intel UHD Graphics GPU manufactured by NVIDIA.

The CPU converts the software into “actions” which are performed by the hardware of the device, and it also decides on what the next action should be performed depending on the signals sent from the hardware. The internal components of the laptop (like RAM, battery, HDD) are connected through registers and buses that carry data from one component to another. Whereas peripheral devices (like a mouse, keyboard, microphone, camera) use Peripheral Component Interconnect (the most common way to attach add-on controller cards and other devices to a computer motherboard), controllers and drivers, that interfaces with the laptop.

The webcam captures light through a small lens at the front using a tiny grid of microscopic light-detectors built into an image-sensing microchip. This splits the image up into millions of pixels. The LCD display on the back of the camera displays the image that is being captured by the webcam. The sensor measures the color and the brightness of each pixel. The image sensor and its circuitry convert the picture into digital format- a string of zeroes and ones. These numbers are transmitted instantly to the computer.

When the users speak the sound waves carry energy towards the microphone. Inside the microphone, a coil is present which is connected to a diaphragm that receives the sound waves and moves back and forth when the waves hit it. The permanent magnet that is connected to the coil produces a magnetic field and the coil moves through this field and an electric field starts to flow through it. The electric field flows to an amplifier converting the sound waves to electricity.

**Operating systems and applications:**

The application we were using was Zoom which is an American communication technology that provides services like video telegraphy and online chat through a cloud-based peer-to-peer software platform. The platform is compatible with Windows, Mac, Linux, Android, and iOS.

The video and audio inputs from the camera and microphone respectively are converted to digital data. This process is known as Analog-to-Digital Conversion (ADC) or also known as sampling. When the user is speaking the waves are converted into electrical signals. The sound waves and signals together form waveforms and are known as analog information. Software is used to compress this data so that it can travel more quickly via Integrated Services Digital Network (a set of communication standards that uses digital transmission to make phone calls, video calls, and transmit data), broadband, or Wi-Fi. This measures the size of the waves in each second and stores each measurement in numbers. So, by sampling, we can turn analog sound waves into digital information. To prevent the loss of information in the process of converting the sound sampling rate is increased to measure the sound waves twice as often. When the data reaches the destination, it is decompressed to be viewed on the monitor and heard through speakers. Due to increasing the sampling rate the bit rates (The amount of information captured after each time the sound is sampled) increase too. This means that the sound will take a longer time to decompress.

The operating system I was using was Windows 11. The operating system can be considered as the foundation of the software of a computer on which other smaller programs are built. The operating system relies on a more fundamental and complex piece of programming called the Basic Input Output System, which is the link between the hardware and the operating system software. The BIOS varies from computer to computer depending on the hardware configuration that is precisely written by the hardware manufacture. The BIOS cannot be considered as a software it is more like a program that is semi-permanently stored into one of the computer’s main chips.

The working of a computer program focuses on four basic things: input, processing, storage, and output. The operating system is responsible for handling all types of inputs like texts through the keyboard, sound through the microphone, and video through webcams. The operating system handles data transfer between all types of peripheral devices.

The application program interacts with the hardware by obeying rules and procedures that are programmed into the computer’s operating system. The operating system acts as a set of services that helps to simplify the development and execution of application programs. Executing a program involves the creation of a process by the kernel that assigns memory space and other resources, loads program binary code into memory, and execution of the program which then interacts with the user and the hardware.

**Data Representation:**

The first major process involved in data representation is Digitization that is the process of converting information such as images, text, sound into digital form that can be manipulated by the electronic devices. The digital data are represented in the form of 0s and 1s that are referred to as binary digits. Digital devices employ a variety of types of codes to represent data, including ASCII and Unicode. American Standard Code for Information Interchange (ASCII) converts characters into a seven-bit code. Whereas extended ASCII uses eight bits to represent each character. On the other hand, Unicode uses 16 bits to represent codes.

To reduce the file size and transmission time, digital data can be compressed. Compression is commonly referred to as zipping. Lossy compression and Lossless compression are the two types of compression that can take place during transmission of any type of data. Lossy compression removes some of the original data during the compression process. Hence, the uncompressed data is different from the original. On the other hand, lossless compression compresses data without losing any information from data.

**Networks and the Internet:**

Voice over Internet Protocol refers to the technology of transmission of voice and multimedia data over the internet network. VoIP uses Internet Protocol, an essential building block of the internet. VoIP services convert the user’s voice into a digital signal which can be transmitted through the internet. The sender’s computer breaks the data into small chunks of data called packets, with an address on each packet telling them the location of the destination computer. Inside of each packet is a piece of type of file that is being transmitted inside the packet. This is known as payload. Now the sender’s computer sends these packets to a nearby router which forwards them to another router closer to the recipient’s computer. When the packets reach their destination, the packets are reassembled to their original state using the instructions contained within the packets.

There are several protocols used during the transmission of data. These protocols define a set of rules in which devices can connect to each other and to the network over VoIP.

The future of video conferencing promises to be more reliable, fully immersed, and provide higher quality with integrated technology. Different video conferencing vendors are doing their best to make their applications stand out by offering new features and increasing the productivity of the meetings. Some features include the usage of Artificial Intelligence for real-time translations or the ability to share short video clips and many other features are also on the horizon. Furthermore, in the future, there will be improved and increased analytics that will evolve to look at more than just the systems and the application’s performance. They would be able to measure productivity by tracking the participants like how often they communicate with others or how they are using the physical and virtual meeting rooms.

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