



Design and Architecture of Desktop LCD Monitor Having Built in Webcam and Microphone with Multi Angled Flexibility

Walelign Tewabe Sewunetie¹, Eshete Derb Emiru²

Lecturer, Dept. of Information Technology, College of Technology, Debre Markos University, Debre Markos, Ethiopia¹

Lecturer, Dept. of Information Technology, College of Technology, DebreMarkos University, Debre Markos, Ethiopia²

ABSTRACT: This study describes Design and Architecture of LCD Monitor Having Built in Webcam and Microphone with Multi Angled Flexibility. A webcam is a device used to capture images, audio and videos. Webcam is either inbuilt or can be externally attached with the laptop or the computer. The most common applications of a webcam are video chat, video recording, image capturing. Unlike laptop, desktop monitors have not a built-in webcam and microphone. Desktop LCD monitors with no integrated webcam and microphone are characterized by their absence of flexibility. Therefore, the building of new enhanced LCD monitor with flexible integrated webcam and microphone can be able to evenly distribute the advancement of communication technology for each user of desktop, and it is achieved through flexible special rubber - like PVC jacket it is possible to create a flexible gooseneck of webcam and microphone.

KEYWORDS: LCD Monitor, Architecture of LCD Monitor, Built in Webcam and Microphone, PCB of the screen, Multi Angled Flexibility

I. INTRODUCTION

Our lifestyles have been change with the advancement in technology especially in the field of computers. Computers are the integral parts of our lifestyles today, and they are found at offices, homes, schools, colleges, hotels, shops etc. This advancement in technology has made our lives easy and comfortable. One of the uses of laptop with integrated webcam and microphone is Skype video chat[1]. LCD monitor is a thin, light computer monitor that displays images through the use of a liquid crystal display. LCD screens are found in most laptop computers as well as in flat panel monitors, and have replaced traditional cathode ray tube (CRT) monitors for many users. A webcam generally consists of a lens, an image, sound sensors and electronic circuitry to process the data colleagues and sends it to PC [2]. A variety of webcams with different features are available in the markets. Depending on the features and quality, the technologies used and the prices vary. However the basic function remains the same, they use when chatting with friends, or loved ones separated by long distances.

Webcams provide 'real time' images – they can be viewed live on a web page. For example, if you have instant messaging software, such as MSN Messenger, you can request to view your buddy's webcam while he/she also looks at yours. The broadcasting end of a webcam captures the images, which are then fed into your computer, through the ISP and on to the internet [3].

Broadcasting can take two different forms depending on the individual's webcam. It either works via streaming, in which images are downloaded in a constant stream; or via Java in which images are captured at intervals and are regularly refreshed by the broadcaster.

There are many different types of webcam available including: [4]

- ✓ **Dedicated webcams** – These are the most common types of webcam available and simply require a USB connection on your computer. They are easy to install (many webcams will become available to use as soon as you plug them in) and they are straightforward to use. Of course they do have their limitations, including a potentially low number of frames per second and poor resolution.



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 7, July 2016

- ✓ **Integrated cameras** – Comes as part of the hardware. Many laptops now include webcams integrated into their design.
- ✓ **Camcorders/security cameras** – Many people now set up security cameras outside their home using a video capture card on the PC. These often come with variable lens options, night-time coverage and filters for daylight
- ✓ **Megapixel cameras** – Due to their excellent quality, megapixel cameras create large files and as such are rarely used for streaming. Instead they are used to capture still images over a consistent period of time – these are particularly popular for refreshing archived images.

II. RELATED WORK

When we compare the price of laptop and desktop computers that have the same performance and brand, laptop computers are more expensive than desktop computer. But the most widely used computer in the world is desktop computer. Thus, due to the advancement of computing technologies nowadays most people like to use these technologies. Webcams take personal computer communications to the next level [5]. Video conferencing and video chat programs enable real-time and face to face personal interaction to be possible; While, mail to someone, waits hours or days for a reply when you could connect instantly and directly. The affordability of low cost computers and web cameras - combined with high-speed internet connections - allows nearly anyone to access, see and speak with others around the country or around the globe. Webcams can help family members to stay connected, help businesses conduct meetings without the expense of travel costs, and they help educational institutions to conduct distance-learning activities, and scientists and researchers remotely monitor sites miles away.

Most people agree that one of the possible reasons that LCD monitors without built-in webcam and microphone is their inflexibility to adjust the direction and focus of webcam[6]. The laptop camera can be permanently pointed at the likely location of the user by adjusting the screen angle for best viewing easily even if the field of view for a laptop is limited.

Embedded cameras are used to capture video for embedded applications. Embedded cameras capture images/video from CMOS or CCD sensors, digitize the data and often perform image/video pre-processing algorithms and/or video compression [7]. Video compression is required for data transmission to ensure the interface of choice which has sufficient bandwidth. Data transmission is typically either over USB wireless, or ZigBee to a main system. The base unit consists of an embedded processor with integrated on-chip peripherals and audio/video acceleration to process encoding/decoding[8].

The core system includes:

- ✓ **Embedded Processor** - An Image Signal Processor (ISP) within our embedded processor is used to improve image quality provided from the CMOS or CCD sensors. The ISP typically does pre-processing algorithms such as noise filtering and image stabilization prior to video compression.
- ✓ **Audio Interface (Voice ADC)** - Uses an analog-to-digital converter to digitize the audio signals. Microphone arrays are used to improve the audio compression quality by focusing on the incoming sound.
- ✓ **Video Interface** - CMOS/CCD sensors come in a variety of offerings. CMOS sensors nowadays come with built-in AFEs (analog front ends) so the output from these modules is already digitized and ready for processing.
- ✓ **The image/video sensor (CMOS sensor)** is the most important part of the webcam. The purpose of the image sensor is to convert the optical light signals into electrical signals. A CMOS sensor is made up of an array of photo detector with amplifiers, noise- correction and digitization circuit. It uses the CMOS technology for its manufacturing. The output of the CMOS sensor is digitalized signals.
- ✓ **The lens** is used to focus the image of objects on the CMOS sensor and it is placed in a separate plastic housing which is screwed to the front plastic casing of the webcam. The housing ensures mechanical stability and protection from external damages. The lens of the webcam is generally made up of plastic and has a fixed focal length. The quality of the lens is defined by the focal length and aperture size.
- ✓ **Power Management** - Power to embedded cameras is typically provided via USB (5 V @ 0.5 A). This power is regulated to usable system voltage rails to power the board. Whether a single-chip power management unit (PMU) or discrete integrated circuits are required.

In the image below you can see the Printed Circuit Board (PCB) that shows the major components: lens, CMOS sensor, microphone, and semiconductor chips.

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 7, July 2016



Fig. 3. Integrated webcam and microphone circuit board

Characteristics of a webcam

The following webcam characteristics considered in this paper[4]

- ✓ **Frames per second** – Arguably the most important aspect of a webcam are the number of frames per second that are recorded which determines the image quality. Generally the speed at which images move will be poorer than on a video camera or a digital camera, even if we have a high-speed internet connection. We should pick up a webcam that records at least 30 frames per second but also bear in mind that it is not just the webcam that determines the quality of the images slow modems, internet traffic and more can all be contributing factors.
- ✓ **Resolution and color** – Webcam resolutions are usually between 160x120 or 320x240 pixels. Higher quality cameras can be picked up with resolutions at 640x480 or above. Generally speaking, the higher the resolution the better the quality of image you should expect. However, it is often a good idea to pick out a camera that will adjust to variable lighting and conditions in order to adjust the picture as you need it.
- ✓ **Digital zoom** – The ability to zoom in on something specific. An optical zoom will actually change the lens position, but a digital zoom merely increases and decreases the size of an area.
- ✓ **Camera control** – Some cameras will allow you to tilt and pan, and others will include a manual focus.
- ✓ **Video conferencing** – Some webcams come with video conferencing capabilities such as lighting and real-time enhancements. We will need video conferencing support from applications such as Windows Live Messenger, Yahoo Messenger, AOL Messenger, Skype and more.
- ✓ **Portable** – Usually this is as simple as a clip on the webcam that means it can be hooked on to laptops.
- ✓ **Microphone** – Many webcams come with in-built microphones so you can enjoy live conversations as you view and chat.

III. PROPOSED DESIGN AND BLOCK DIAGRAM

The main objective of this study is to allow desktop users can able to use webcam technology on a new enhanced LCD monitor that has flexible built-in webcam and microphone. For a desktop LCD monitor the field of viewing a visual aspect of something is much wider and the camera is much more likely to need adjustment. To avoid this limitation, it is possible to make the integrated webcam and microphone gooseneck flexible as shown in fig 1.



Fig. 1. Flexible gooseneck

These cables are small in size, and have special rubber - like PVC jacket is extremely flexible and exhibits good resistance to the rough handling and abrasion [9]. High grade insulation material is designed to minimize heat shrinkage during soldering.

Advantage of Gooseneck on Webcam

The problem with some microphone stands is that they are hard to reposition quickly and easily.

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 7, July 2016

- Using this gooseneck, you can add the adaptability of webcam.
- The neck of the gooseneck is made from interlocking rolled metal to give you flexibility while maintaining exceptional strength.
- Add flexibility to your webcam stand to easily reposition it to your liking with this gooseneck.
- Solid steel threaded male and female ends ensures that the gooseneck will stay in place

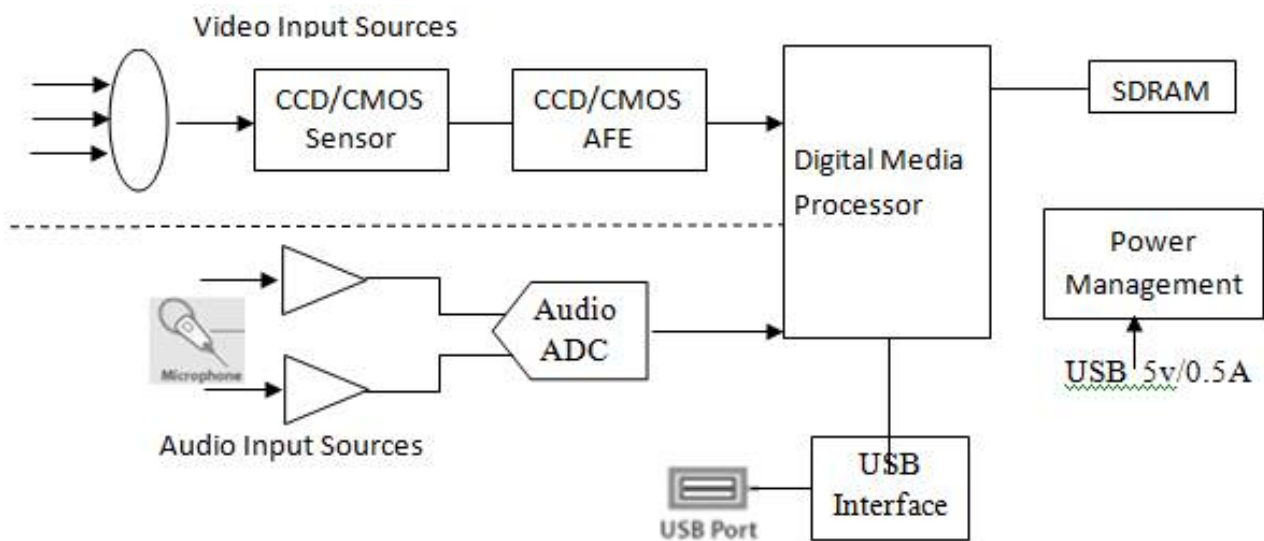


Fig. 2. Block diagram of a basic webcam using the minimum of external components.

IV. SIMULATION RESULTS

The built-in webcam and microphone makes it easy to take pictures or stream live images across the Internet – and connect in real-time with friends, family, and colleagues.



Fig. 4. Proposed prototype of LCD monitor with flexible built-in Webcam and Microphone

The gooseneck of the webcam is very flexible so that the user can change or rotate in to any direction and both microphone and webcam are integrated in to one circuit on the top of the gooseneck. The webcam gooseneck is attached to on the top part of the LCD monitor and passes the cable internally through the monitor and connects to the bottom part to the port. This port is used to connect the USB cable; the main purpose of USB cable which connects the Webcam to the System unit. The power source of the integrated webcam is from the system unit using USB cable. The webcam is controlled entirely through PC drivers over USB.



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 7, July 2016

V. CONCLUSION

The focus of this paper was to describe the building of the enhanced LCD monitor with integrated webcam and microphone. One of the reasons of most LCD monitors without integrated webcam and microphone is characterized by inflexibility. The building of new enhanced LCD monitor with flexible integrated webcam and microphone can be adjusted to evenly distribute the advancement of communication technology for each desktop user. Using flexible special rubber - like PVC jacket is possible to create a flexible gooseneck of webcam and microphone.

REFERENCES

- [1] S. A. B. a. H. G. Schulzrinne, "An Analysis of the Skype Peer-to-Peer Internet Telephony Protocol," Columbia University, New York NY 10027.
- [2] V. S. P. Scholar, "Real Time Hand Gesture Recognition for Human Machine Communication Using ARM Cortex A-8," IOSR Journal of Computer Engineering (IOSR-JCE), vol. 16, no. 2, pp. 43-48, Mar-Apr. 2014.
- [3] M. Studios, "User Manual for webcamxp 5.5," 2010.
- [4] phoenolp. [Online]. Available: [http://www.moneysupermarket.com/broadband/webcams/..](http://www.moneysupermarket.com/broadband/webcams/)
- [5] Joan Squelch, Andrew Squelch, "WEBCAMS IN SCHOOLS: A PRIVACY MENACE OR A USEFUL MONITORING TOOL?," Australia & New Zealand Journal of Law & Education, vol. 11, no. 2, pp. 55-66, 2005.
- [6] philg, "why-dont-most-lcd-monitors-come-with-built-in-cameras/," 20 September 2010. [Online]. Available: <https://blogs.harvard.edu/philg/2010/09/20/>. [Accessed 5 July 2016].
- [7] "Embedded Camera System," [Online]. Available: [http://www.ti.com/solution/embedded_camera_system#Design Considerations](http://www.ti.com/solution/embedded_camera_system#Design%20Considerations). [Accessed 10 July 2016].
- [8] "Guide to webcams," [Online]. Available: <http://www.moneysupermarket.com/broadband/webcams/>.
- [9] "Mogami The Cable for the Pros," [Online]. Available: <http://www.mogamicable.com/category/bulk/microphone/high-performance/>. [Accessed 11 July 2016].

BIOGRAPHY



Walelign Tewabe is earned his BSc in Computer Science from Mekelle University and his MSc in Computer Science from Arba Minch University. He is a lecturer in Department of Information Technology, College of Technology of Debre Markos University, Ethiopia. He has published several research papers in reputable journal publication.



Eshete Derb is earned his BSc in Computer Science and Information Technology from Haromaya University and his MSc in Computer Science from Adiss Ababa University. He is a lecturer in Department of Information Technology, College of Technology of Debre Markos University, Ethiopia. He is also acting as director of Library and Information service Directorate Director at Debre Markos University. He has published several research papers in reputable journal publication.