Vision Enhancement Systems - Closed Circuit Television System - The Aravind Model

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The first closed circuit televison was developed in 1969 by Sanuuvell Gensky at the rand corporation. The standard CCTV consists of three major components camera , monitor and moveable reading platform.

Most CCTV's systems made in1989 or later used a Changed Coupled Device (CCD) camera. The advancements of ccd camera are enhanced image contrast, brightness and clarity of images increased depth of field.

Closed Circuit Television

A monitor serves as a screen on which the enlarged print image is projected. Majority of the CCTV are accompanied by a built in or attached illumination source. Reflected glare reduced with adjustment of manual controls for brightness, contrast colour and image polarity.

Aravind Eye Hospital has come out with a n innovative and cost effective Closed Circuit Television for low vision patients. This system comprises of a scanner using a surveillance camera mounted in a plastic box. This scanner is connected to the power supply and then to a television set. Desired magnification can be achieved by adjusting the camera in the scanner.

Some CCTV have the reverse polarity (WHITE LETTERS ON BLACK BACKGROUND) and also have a photomode which when selected reverts the camera to a preset contrast and brightness mode that is ideal for viewing photos (black and white)

Portable closed circuit televison

These systems are ideal for the low vision patients who travels often. The camera can be powered by rechargeable battery. Magnification is variable and can be changed by raising or lowering the cameras from the reading material as the screen size is increased so is the magnification of the print projected on the screen. For example, when a print size on a 19inch screen is projected on to a 27inch screen 1.42x magnification is obtained.(27/19=1.42).

Some manufacturers of a portable CCTV's have recently introduced head mounted systems .The headset is connected directly to the camera and a battery pack. The images from the camera is projected on to the headmounted display system and can produce magnification upto approximately 25x. One of the major advantages of these systems is that they allow patients total portability.

Magnification and equivalent power of a Closed Circuit Television

There are several approches to determine how much magnification a patient is achieving with a CCTV. The measurements that must be taken are the print size of the enlarged image on the cctv monitor, actual print size and working distance. The formula for calculating the total magnification is as follows M = (X) x (Y)

Where X = print size on the monitor divided by actual print size; Y = reference distance (25cm or 40cm)

Head mounted systems

The low vision enhancement system was the first of its kind developed for low vision patients. The lves was initially developed by a team of doctors and

researchers at John Hopkins School of Medicine (Baltimore) along with the national aeronautics and space administration and the veterans administration This electronic vision system weighs 2.5lb and is worn on as a headmounted system.

- The approximate field is 50 degrees, in the horizontal direction and 38 degrees in the veritcal. The head set has a automatic focus camera in the center, that has the ability to focus in or out along with the ability to produce magnification at a distance from 1.7x to 7.5x. The head system is connected to a portable control box while watching the television or while seeing a print on a computer screen, it can be connected directly to the television or computer and there by bypass the lves unit cameras.

The lves is recommended for patients with visual acuity ranging from 20/100 to 20/800. for the patients requiring a refractive correction. Prescription glasses can be incorporated directly in to the head set.

Suggested Reading

1. *The lighthouse hand book on vision impairment and vision rehabilitaion* . Vol2. 2000, p966.
2. Richard l. brilliant .*Essentials of low vision practise* 1999.p240-248.

V-max

The V-max is the next generation of a head mounted device that addresses distance, intermediate and near vision. It is an automatic focus system with a range of magnification at a distance from 0.8x to 20x with five customized preset magnification levels weighing 23 0z. a high resolution camera set is at the center of head mounted unit which ergonomically designed to minimize neck strain. The camera has an inbuilt vision stabilization system that compensate for small head movements. The field of view of this system is 47 degrees horizontally and 36 degrees vertically. objects can be enlarged 60 times their original size, which also depends on the size of the television screen. A tremendous amount of progress has occurred in a very short time in the area of electronic magnification it is anticipated that much more progress will occur as researchers and manufacturers attempt to build the ultimate low vision system.