

PC BASED SLIT LAMP EXAMINATION FOR TUTORIALS AND TELEMEDICINE

Kavitha. R, (Ph.D.), M.Tech.

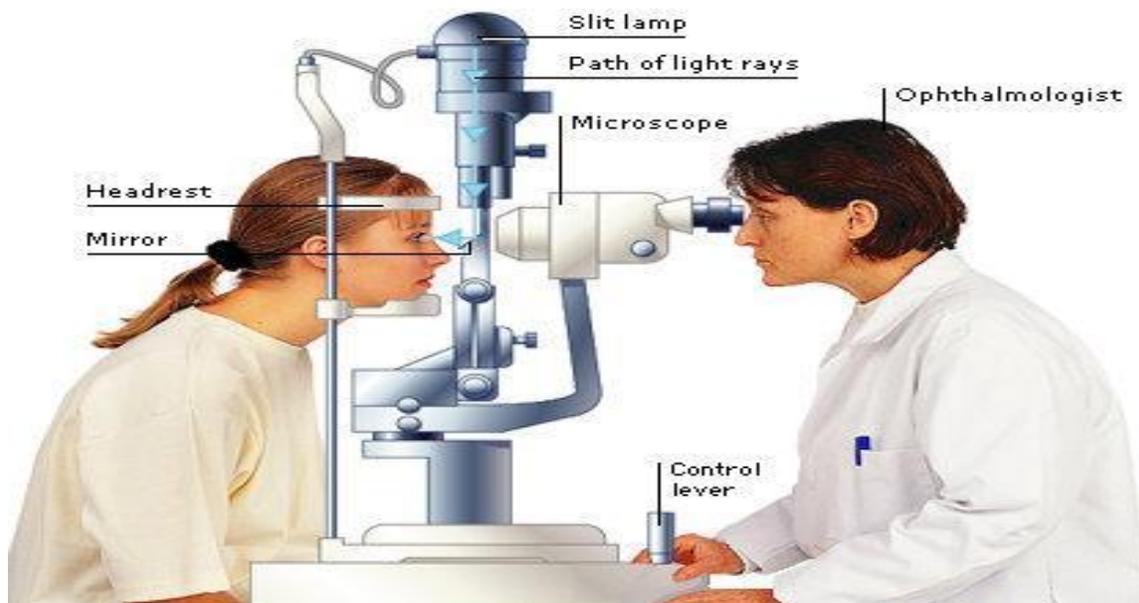
H.O.D-Medical Electronics,

Department of Medical Electronics. M.V.J.C.E

Abstract: The slit lamp is perhaps the most important tool for examining the human eye in clinical ophthalmology. The slit lamp is useful for ophthalmologists as well as optometrists. The basic slit lamp design remained almost same since its discovery about 70 years ago. The slit lamp examines anterior segment, posterior segment and fundus of the eye very effectively. Various disorders and disability of eye can be detected by slit lamp. With the advent of telemedicine, the examination of critical disorder and disability of eye can be diagnosed virtually by a super specialist. This is so more important considering the involvement of optometrists screening and diagnosing various groups of people for eye disorders and disabilities. The above project envisages to design fabricate and test a video system that can be fitted to the existing slit lamp without any modification, for pc based capturing, storing and can be used for teleconference and telemedicine. The system can also be used for clinical tutorials to group of students locally or tele tutorials. The system can also be used with transmitter placed in mobile for rural clinical ophthalmology. Thus the project can be used successfully in the medical colleges and for clinical purpose in effective storage and retrieval of images when needed. The major advantage of this project is to store the details of patients eye as jpeg or mpeg in a pdf file with identification of patients database and comment on his health. In the future reviews, this can be called back to verify the status of the same eye with the previous captured pictures.this has been carried out in vijaya hospital and health centre, vadapalni,Chennai.clinical trials are done in RAVIKUMAR EYE CARE hospital.

INTRODUCTION

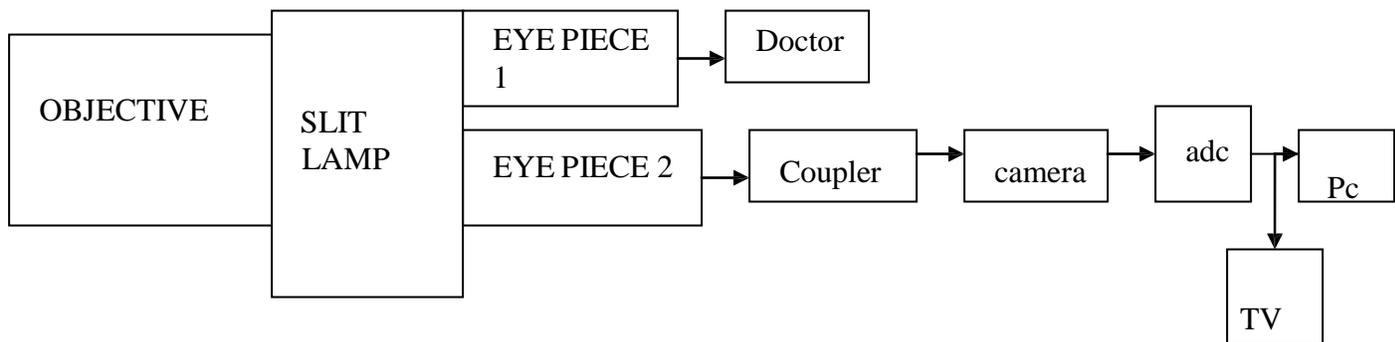
A slit lamp is an instrument that enables a doctor to examine the entire eye under high magnification. The slit lamp focuses a bright light into the eye Lamp Examination. The slit lamp is a table-mounted binocular microscope that shines a light into the eye to allow the doctor to examine the entire eye under high magnification. The slit lamp has better optics than the ophthalmoscope, providing magnification and a three-dimensional view, which allows measurement of depth. Often, eye drops are used to dilate the pupils so that the doctor can view even more of the eye, including the lens, vitreous humor, retina, and optic nerve. Sometimes, in people with suspected or known glaucoma an additional lens is placed on or held in front of the eye to allow examination of the "angle" between the iris and the front part of the eye (inside surface of the cornea). This examination is called gonioscopy The slit lamp exam uses an instrument that provides a magnified, three-dimensional (3-D) view of the different parts of the eye. During the exam, your health professional can look at the front parts of the eye, including the clear, outer covering (cornea), the lens, the colored part (iris), and the front section of the gel-like fluid (vitreous gel) that fills the large space in the middle of the eye.



Slit lamp Examination

Slit lamp Examination	
Normal:	The eyelashes, eyelids, and lining of the eyelids (conjunctiva) look normal. All of the structures inside of the eye look normal.
Abnormal:	<p><u>Cataracts</u></p> <ul style="list-style-type: none"> • Changes in the <u>cornea</u>, such as an irregularly shaped cornea or a corneal scratch (abrasion), ulcer, or infection • A foreign body, such as a metal fragment • Infection, such as <u>iritis</u> or <u>conjunctivitis</u> • Bleeding between the <u>iris</u> and cornea (hyphema) from a sudden break in a blood vessel or as a result of an injury to the eye

Block diagram of the project



The eye is the body's sense organ for vision. This remarkable organ converts the energy of the light in to electrical nerve impulses that are interpreted by the brain as sight. The basic diagnostic tool for the examination of the eye is SLIT LAMP. The slit lamp biomicroscope in its most basic form consists of an illumination source with a range of light intensity settings and a microscope with series of magnification settings and a microscope. Many accessories are now available that extend the usefulness of the instrument dramatically. The additional

observation tubes allow more than one clinician to observe the same patient simultaneously.

Main block

This includes the camera and the coupler being used in this project. The coupler, made of aluminum is made to hold the camera circuitry with the eye piece of the slit lamp. The coupler is anodized to match with the color of the slit lamp. The output Images of the camera through the coupler can be connected to a PC via usb cable for diagnosing and effective storage and retrieval of the images of the patients eye.

7.2 DESIGNING OF THE COUPLER

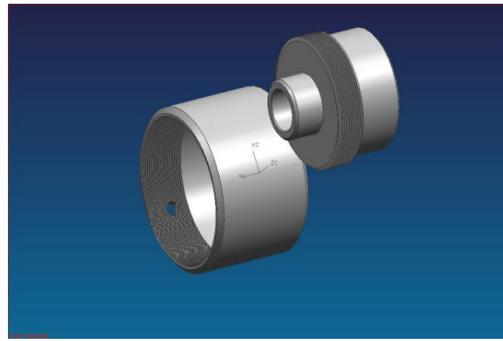
Material used : aluminium

Property :light weight,high strength,less corrosion

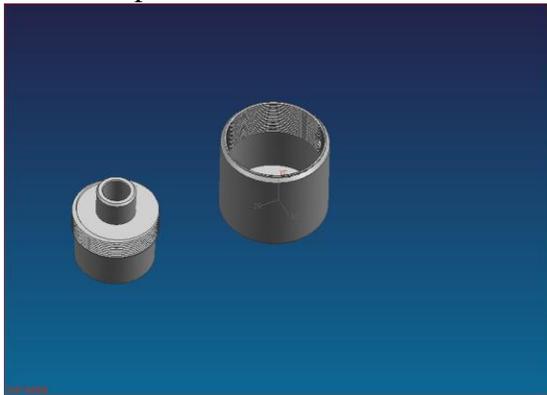
Bottom piece :internal dia-14 mm Seat 48 mm id Length:29 mm
 top piece: external dia -31.4mm



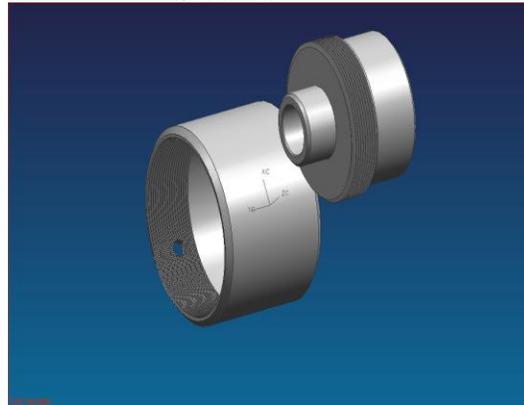
Top view



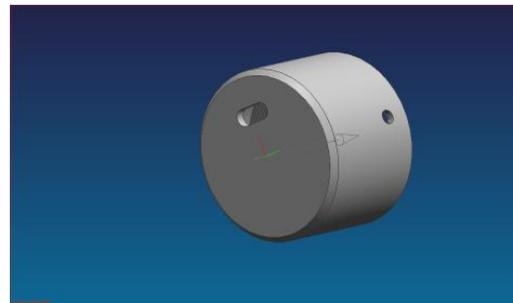
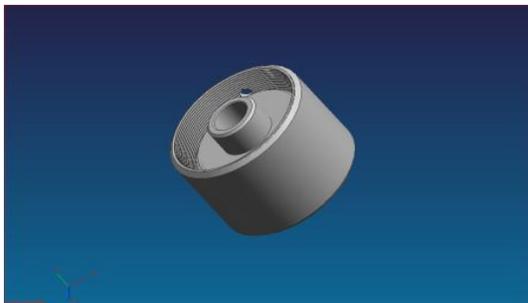
Side view



Top and Bottom piece fixed together



top piece (back view)



Camera components

40MHz processor from Microchips

Sony CCD Vertical clock driver

Sony ICX255 / 429 / 285 bw & color ExView CCD chips

USB 1.1 communications port

The ADC is a ADS8322 from TI (16bit)

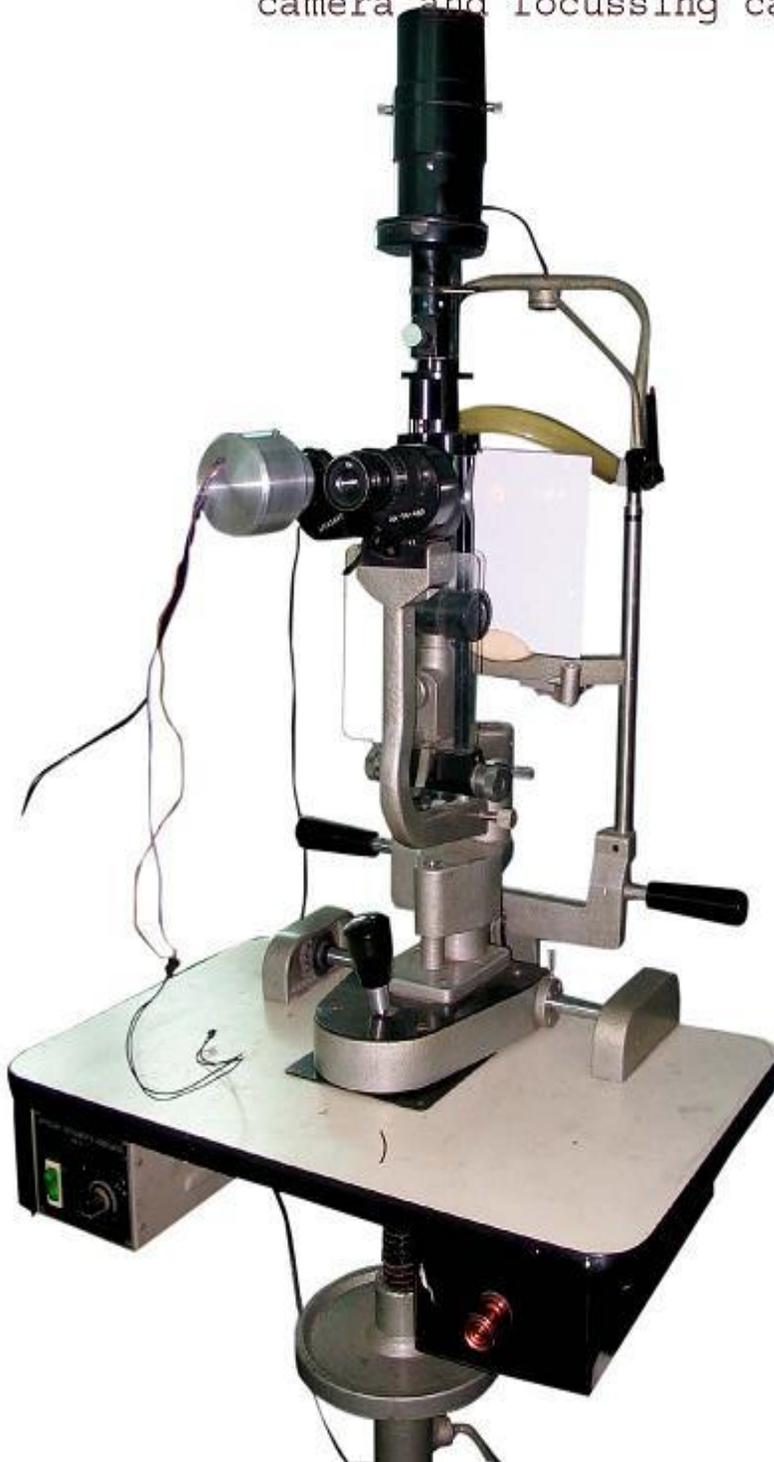
The camera has a standard ST4 type guide port for interfacing with compatible mounts

coupler (camera circuit inside,USB cable)



This is the complete set up of project conclusion

slit lamp (coupler,
camera and focussing card)

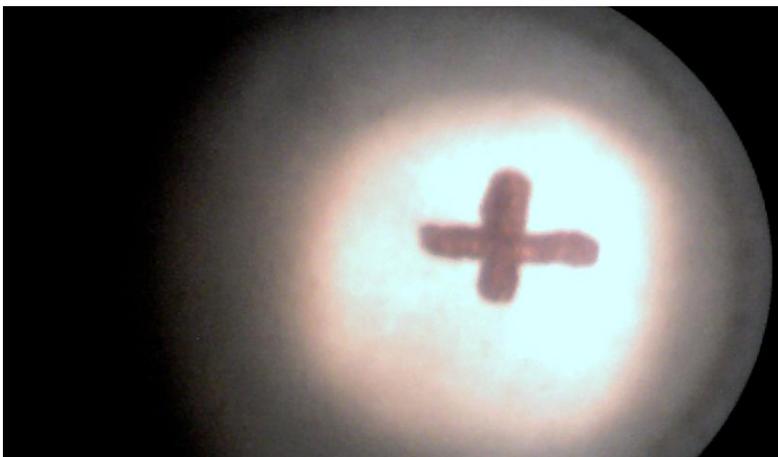


This project has been tested in an eye care hospital, from which the following real time images are obtained, The project has been very useful to study the patients history on ophthalmology care on the basis of pre and post treatments.

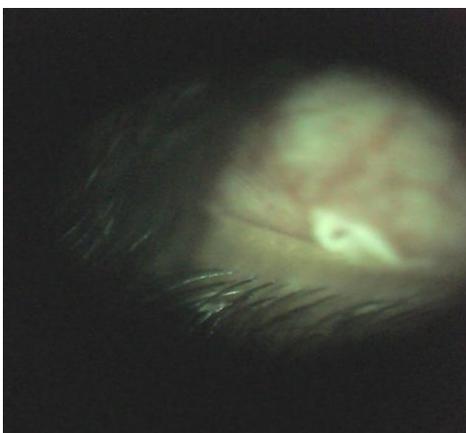


Complete set up of the proposed slit lamp

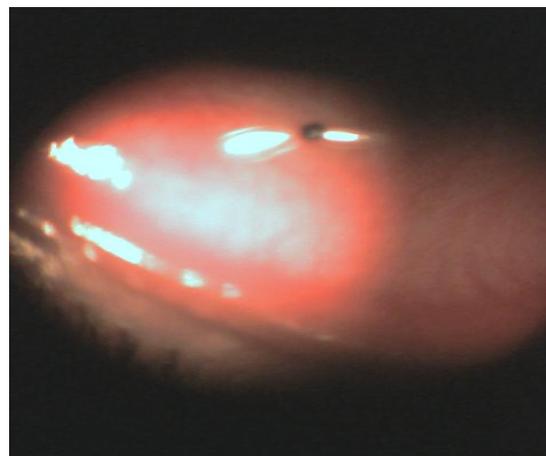
This Image was taken by holding a test piece on the slit lamp instead of patients eye



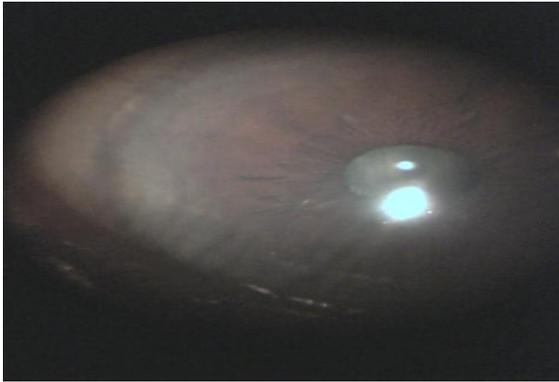
Patient real time images



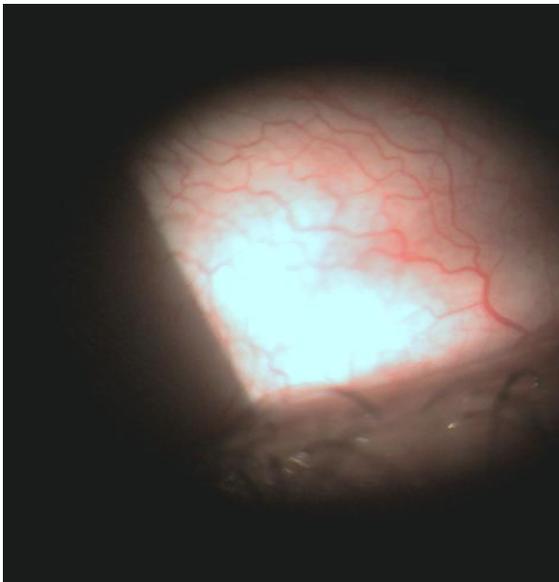
Conjunctivitis patients eye image



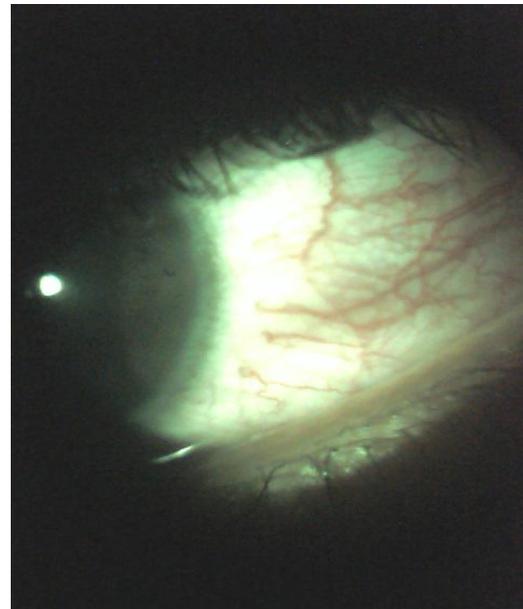
Foreign body fallen inside patients eye



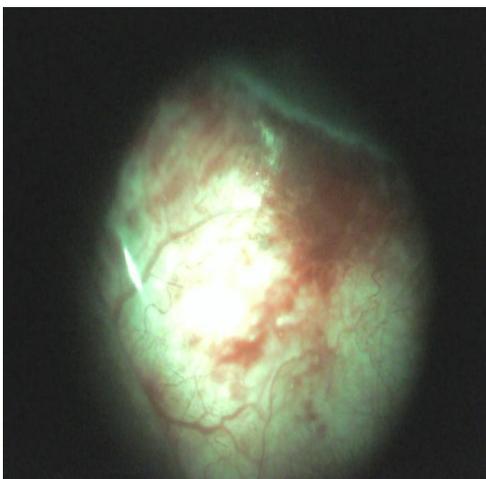
Immature cataract of a patient



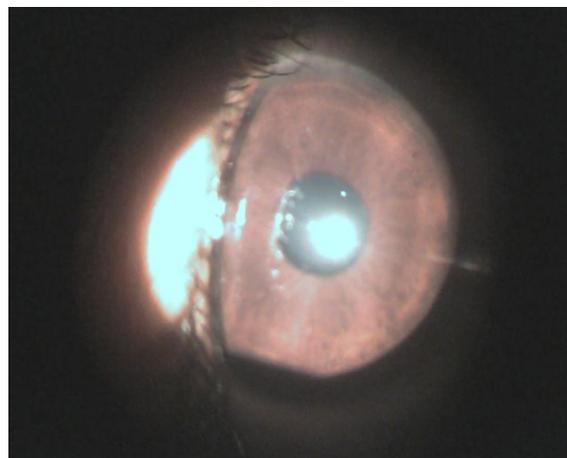
Sub acute bacterial conjunctivitis



purulent acute conjunctivitis



Redness of eye



Cataract patients eye

Conclusion:

This is very useful for the telemedicine as the pictures of eye can be taken instantly and transfered to the ophthalmic centre for the doctors opinion and treatment, and also, it would be of great use in the college of eye care, where the doctor would be able to examine the patients eye and teach the students as well.

References:

- Diana University School of Optometry. "[Slit Lamp Illumination Types](#)". Indiana University, Indiana: 2007. □ "Eye Examination with the Slit Lamp", Zeiss, p. 17
- "Eye Examination with the Slit Lamp", Zeiss, p. 18
- "Eye Examination with the Slit Lamp", Zeiss, p. 19