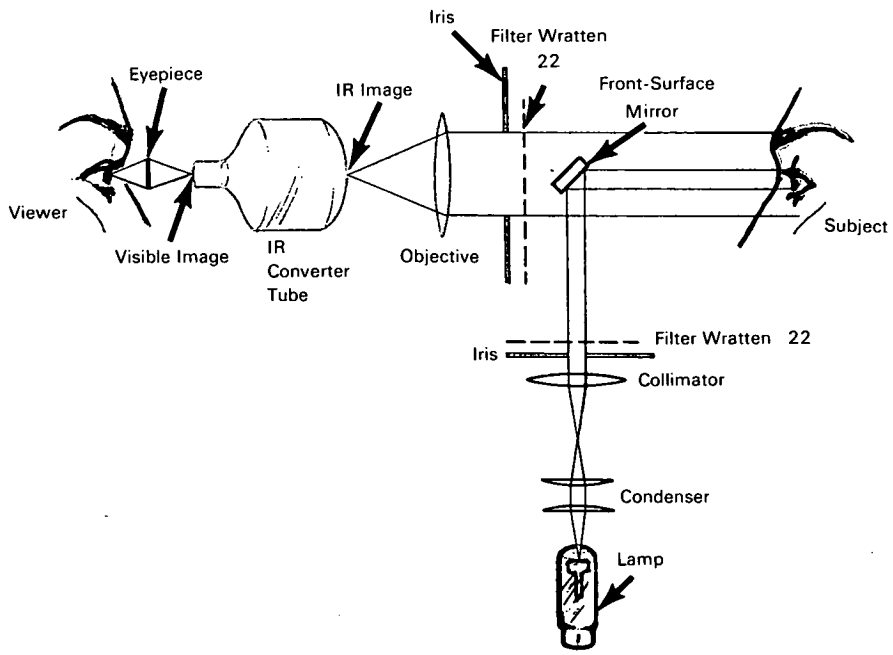
NASA TECH BRIEF

Infrared Viewing Would Permit Human Iris Response Studies



The problem:

To monitor and measure the iris dilation of a human eye. The technique must not interfere with the normal responses of the subject's eye during performance of the assigned tasks.

The measurement of eyeblink, eye movement, and possible pupil diameter without attached sensors depends entirely on the measurement of reflected light from some portion of the eye. If the light path is directly along the longitudinal axis of the eye, retinal reflections may be obtained; other angles give reflections from the iris and/or the sclera. Previous devices used to scan the surface of the eye restricted the head motion or interfered with the normal performance of the subject.

Proposed solution:

A technique, using an infrared image converter tube and a filtered source, permits observation of the human eye in the near infrared region, with a minimum of stimulation to the eye except by normal ambient lighting. The device allows monitoring and measurement of the eye of the subject during experimental task-work operations to obtain a more natural measurement of unimpeded iris response.

How it's done:

The illumination is supplied by a microscope illuminator, using an incandescent ribbon-filament lamp. The visible light is removed with a Wratten infrared filter and the resulting transmitted light is focused on

(continued overleaf)

the subject by a small front surface mirror within the beam of collimated illumination. Thus, the light is directed at an angle of 90 degrees from the source of illumination. The light reflected from the subject's eye is passed through a Wratten filter of the same transmission characteristics as the filter in the illuminating beam. It is then focused on the sensitive surface of the image-converter tube with suitable lens combinations.

The viewing surface of the image-converter tube is observed with the aid of an eyepiece magnifier.

The near-infrared wavelengths are used because they allow use of very high energy levels while the subject experiences only the normal ambient lighting conditions required for his visual tasks.

Notes:

1. This technique was only in the experimental stage as of the date of this Tech Brief.
2. An extension of this technique uses a television camera for the viewing system. An IR sensitive vidicon tube in the camera replaces the IR converter tube. This system further reduces the background signal from the sclera and eyelids, and enhances the retinal reflection.
3. Inquiries may be directed to:

   Technology Utilization Officer
   Electronics Research Center
   575 Technology Square
   Cambridge, Massachusetts 02139
   Reference: B68-10206

Patent status:

No patent action is contemplated by NASA.

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