VIVEKANANDHA MEDICAL CARE HOSPITAL
ALLIED HEALTH SCIENCES

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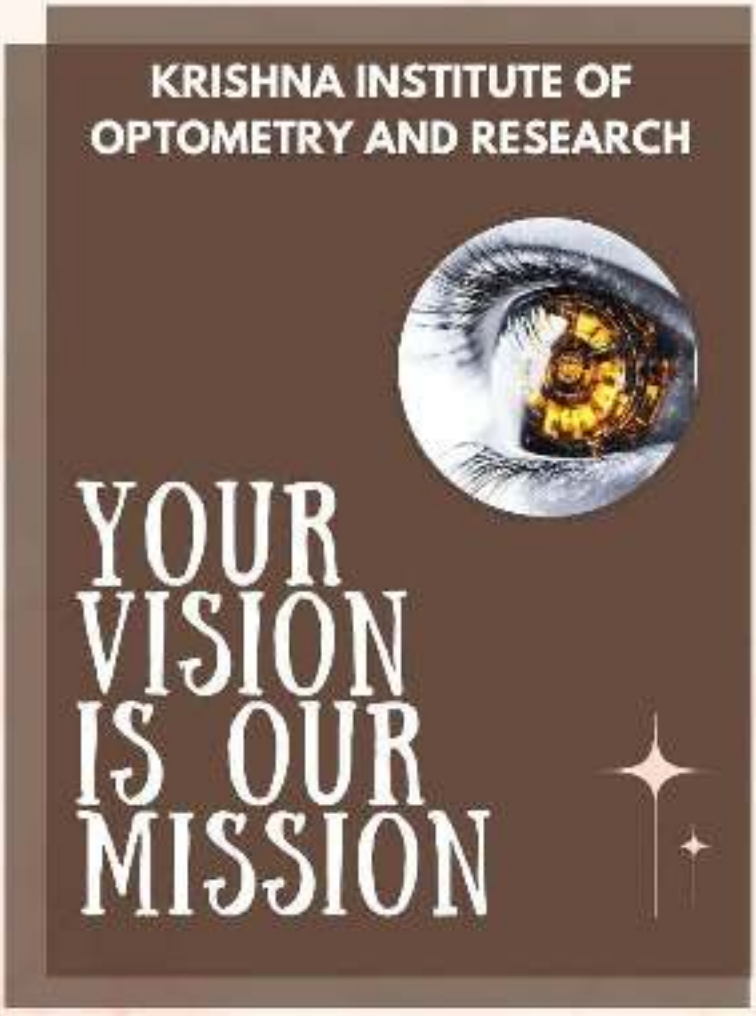
LET'S LEARN VISUAL PROSTHESIS

SPOTLIGHT

THE STUDENT MAGAZINE



EDITORIAL BOARD

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VISUAL PROSTHESIS

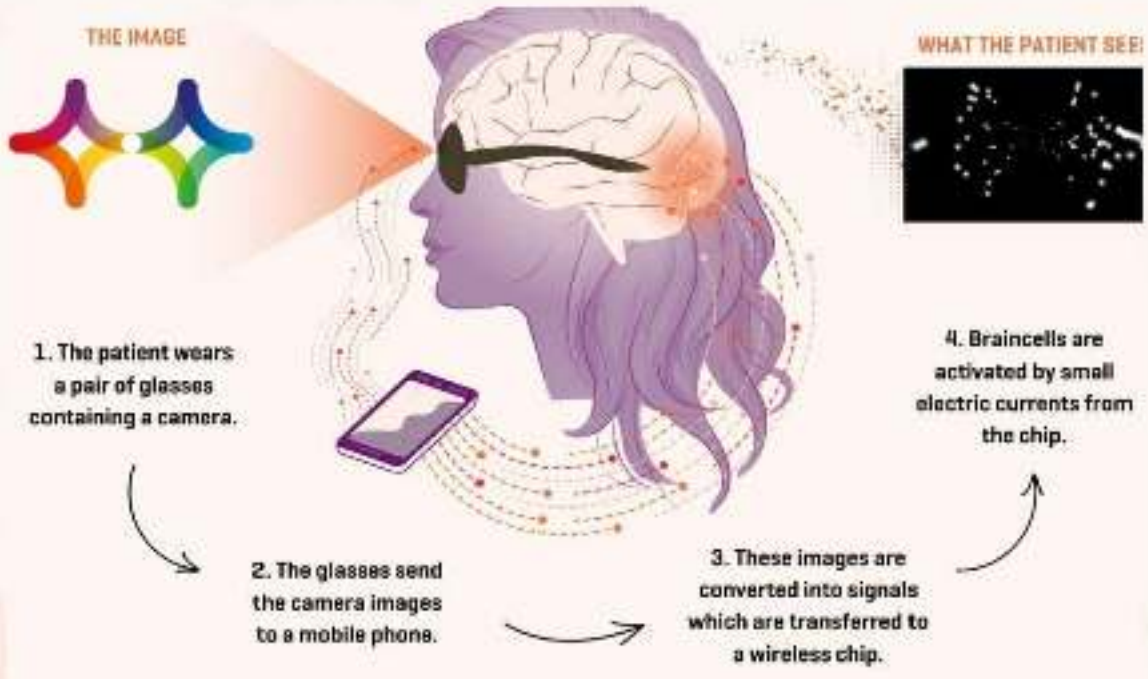
INTRODUCTION

Visual prosthesis is also known as bionic eye.

- A visual prosthesis is an electronic device that helps the blinds to regain visual perception.
- Camera or other imaging resource is used to derive electrical stimulation of remaining healthy cells or structures to create artificial vision.
- Minimum age limit for fitting visual prosthesis is around 25 years old.

PRINCIPLE

- Visual prosthesis providing a focal electrical stimulation to intact visual structures including the retina, optic nerve, lateral geniculate nucleus and occipital evoking the sensation of discrete points of light called phosphenes.



WHY VISUAL PROSTHESIS?

- There is no effective treatment for patients who are visually handicapped as a result of degeneration or damage to retina, optic nerve, visual parts of brain.
- Visual prosthesis serve to restore visual function.

HISTORY

Luigi Galvani's(1791)

Electrical activity of the nervous system on animal tissue.

Otfrid Foerster(1929)

Demonstrated electrical stimulation of the visual cortex could lead to a subject's "phosphenes."

Giles Brindley(1960)

Concept of electrodes below the scalp to stimulate a Subject's occipital lobe.

Dr.Eduardo Fernandez(1962)

He developed therapeutic approaches for retinal degenerative illnesses.

W.S.Lewin(1967)

First performed human test of the device.

William H.Dobelle 80's & 90's

The development of a prosthetic tool called the "Dobelle eye" that stimulates a blind person's visual cortex

IMPLANTATION IN ANIMAL

DR.JOSE ALAIN SAHEL

Rats and Sheep were used to test the biocompatibility of retinal prosthesis

DR.LUIGI GALVANI'S

DR.MARK HUMAYUN

IMPLANTATION IN HUMAN

DR.WILLAIM DOBELLE

The pioneering work in the field of visual prosthesis paved the way for later developments, including the Argus II implant developed by Dr.Mark Humayun.The system was designed to help people with retinitis pigmentosa a degenerative eye disease regain some level of vision by passing damaged photoreceptor cells in retina and directly stimulating retinal neuron with electrical impluses.

COUNTRIES OFFERING IMPLANTATION

North America

United Kingdom

United States

Japan

Europe

Germany

France

India

COMPONENTS OF VISUAL PROSTHESIS MECHANISM

EXTERNAL COMPONENTS

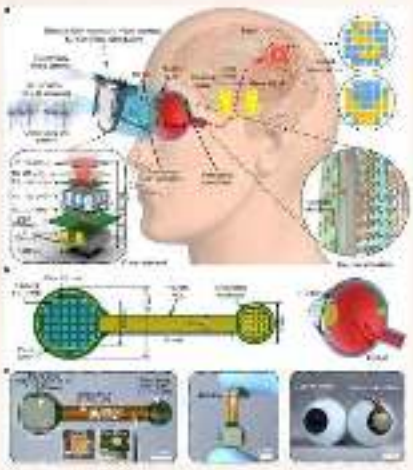
1. Camera
2. Processing Unit
3. Transmitter

INTERNAL COMPONENTS

1. Receiver
2. Electrode Array
3. Power Source

MATERIALS USED IN VISUAL PROSTHESIS

Silicone
Titanium



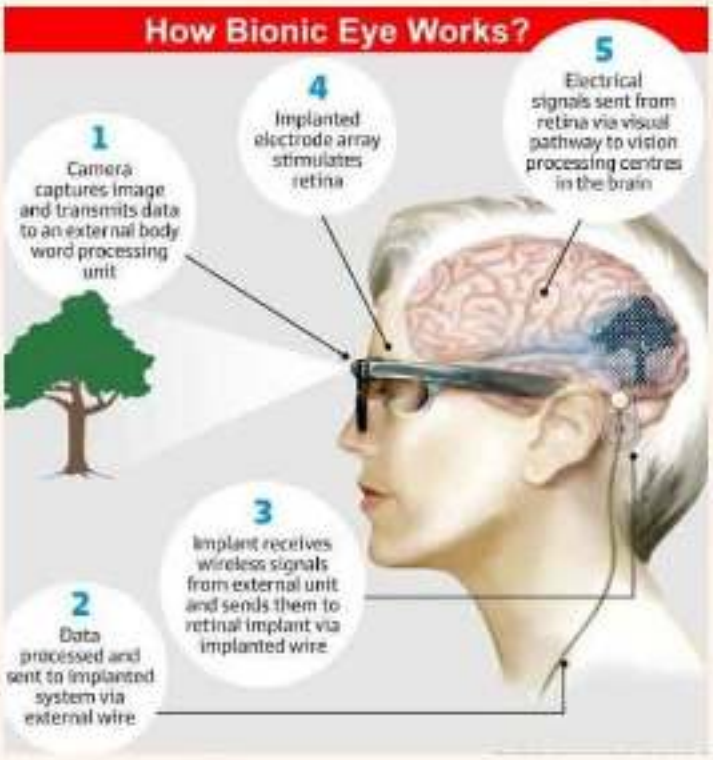
Platinum Iridum
Alloy

Hydrogel
Polymers

Ceramics
Gold

Graphene

STEPS INVOLVED IN VISUAL PROSTHESIS MECHANISM

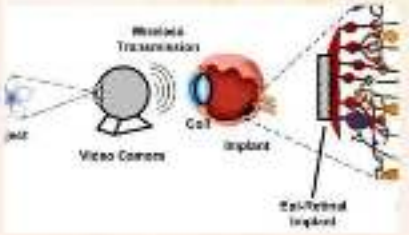


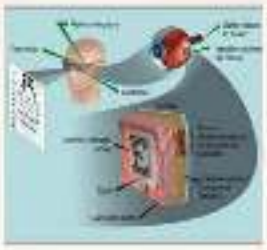
- Image Capture
- Image Processing
- Signal Transmission
- Neural stimulation
- Perception Of Vision
- User Adaptaion and Training

TYPES OF VISUAL IMPLANT

1.EPIRETINAL

It stimulates retinal ganglion cells.



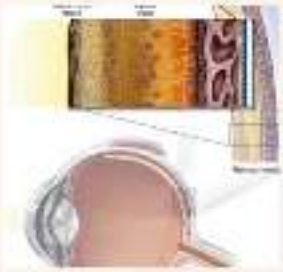


2.RETINAL

It also stimulates retinal ganglion cells.

3.SUBRETINAL

It stimulates bipolar cells and inner retina .

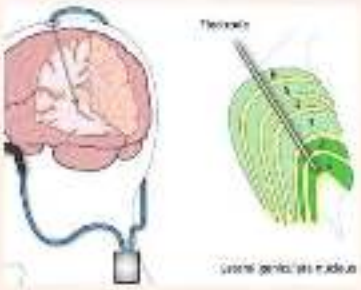


4.SUPRACHOROIDAL

It stimulates retinal neurons.

5.OPTIC NERVE

It stimulates optic nerve fibres .



6.LATERAL GENICULATE BODY

It stimulates relay neurons .

7.VISUAL CORTEX

It stimulates visual cortex neuron.

ADVANTAGES

RESTORATION OF BASIC VISION

IMPROVED MOBILITY

IMPROVED QUALITY OF LIFE

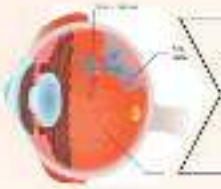
IMPROVED BRAIN ADAPTATION

PSYCHOLOGICAL BENEFITS

ADAPTATION AND LEARNING

DISADVANTAGES

POOR HEAT DISSIPATION



TRAUMA TO THE RETINA

SURGICAL COMPLICATION

LIMITED VISION QUALITY

POWER AND DATA TRANSMISSION

EXPENSIVE

REFERENCE

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International Journal of Retina and Vitreous volume 9, Article number: 73 (2023) C

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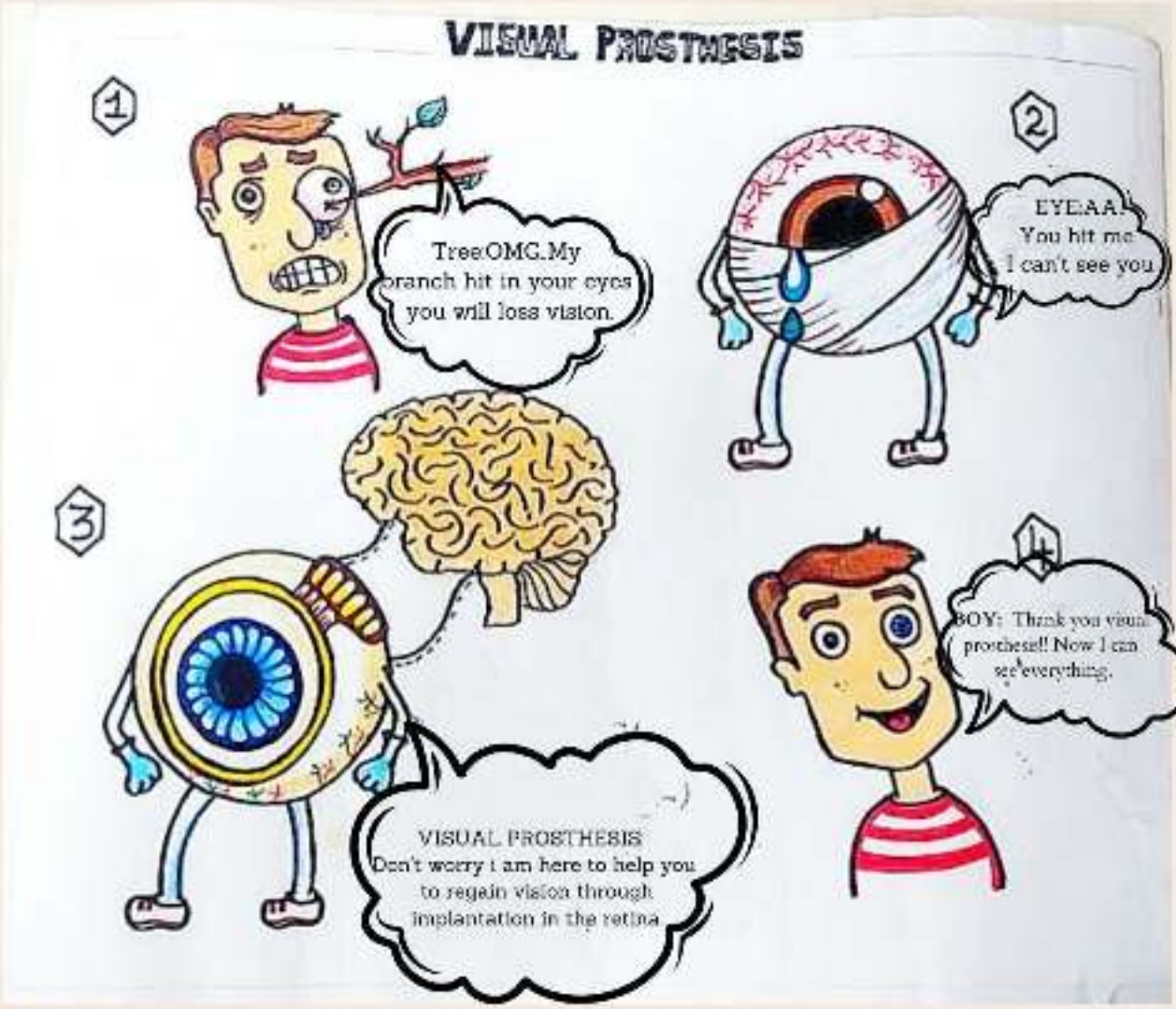
STUDENT'S CORNER

Caricatures

DARKNESS TO BRIGHTNESS



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DEPENDENT TO INDEPENDENT

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POEMs

SPARK OF HOPE

A chance to see, to perceive
and to know
A gift of sight, for those
who've lost their glow
In darkness, a spark takes flight
A Prosthetic eye, shining bright

K.RESHMA
III-B.SC., OPTOMETRY

SPARK OF SIGHT

In darkness, a light begins to gleam
A spark of hope, a new dream
For those who dwelled in endless night
A chance to see, a new delight

The implant's threads, a delicate dance
Weaving sight, a second chance
Electrodes whisper, a gentle tone
Awakening vision, long unknown.

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