

Silicon Eye

S. Thuvvakkadan and V. J. Nair
Anna University

Silicon eye can be otherwise called as a complete eye implant. The project overview is given in brief by the description of main components. Here in the silicon eye, a biconcave gel lens is used in connection with a micro controller. A porous silicon nano photodiode is placed before the gel lens. This specially designed transparent diode will help in identifying the intensity of light receiving in the beginning of the processing chain. An effective drainage system (with the help of two valves) will control the working of gel lens. All these components together form the pri-

mary circuit to enable the process of auto focusing. The micro controller is connected with all components of the system. The primary circuit is connected to a secondary circuit which consists of an artificial silicon retina and a chemical synapse. By the combined and co-ordinate working of both these will enable vision. The power supply, which all the electrical components here need is given by a series of nano paper batteries placed beneath the retinal layer (carbon nano tubes can also be implemented instead or along with it). The converted electrical impulses (from intensity of light received) will be carried to the visual area of brain through optic nerve by the effective interaction with a number of artificial chemical synapses. Finally this silicon eye will be an effective implant for the damaged eye. And we are sure that this will be a great breakthrough in the modern medicine.

Harmonic Focus Case Study: Leading Innovation Through Unique User Research Methods and Tools

Stuart Morgan
Ethicon Endo-Surgery

Stephen Wilcox
Design Science

Ethicon Endo-Surgery's Harmonic FOCUS is a curved-shear (blade with clamp arm) surgical instrument that combines the intuitive elements of a classic precision instrument with a Harmonic ultrasonic hand piece for a revolutionary multifunction precision device. We propose to describe the unique approach to user research used in the development of the product and how the team used these innovative methods and tools to identify and meet the following design and engineering challenges: 1. Combine the surgical tasks of dissecting, grasping and simultaneously cutting and coagulating into one precision device for the first time. The Harmonic FOCUS was developed as a result of three years of extensive market assessment and a unique research methodology, including a novel process of ethnographically observing and graphically mapping thyroidectomy procedures. 2. Miniaturize the

hand piece (transducer) from the existing ultrasonic product line while retaining its clinical performance (speed and hemostasis). The following dramatic and extensive design changes offer improved clinical performance: Reducing the volumetric size of the transducer 55% relative to the predecessor device. Achieving reliable control of clamp force. Curving the blade to resemble typical surgical instruments. Improving speed of operation. Reduction of residual heat. 3. Provide the surgeon with superior and intuitive ergonomics by leveraging elements of a classic precision tool. The team combined the essential elements of a classic precision tool with Harmonic (ultrasonic) technology to develop a revolutionary, multifunctional device with superior and intuitive ergonomics. Surgeons concur with the versatile, comfortable design. 4. Use materials that are all sterilization-compatible. Extensive research was done to identify and use materials that were all compatible with ethylene oxide sterilization. The device is packaged in flexible packaging and ethylene-oxide sterilized prior to sale. Harmonic FOCUS is designed for single-patient use. The Harmonic Blue Hand Piece is sold non-sterile and is qualified for multiple sterilization methods readily available in hospitals. The hand piece can be reused up to 100 times.